MATERIALS BUREAU

MATERIALS METHOD 9.1

PLANT INSPECTION OF PORTLAND CEMENT CONCRETE

JANUARY, 1975

NEW YORK STATE DEPARTMENT OF TRANSPORTATION
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DEPARTMENT OF TRANSPORTATION

MATERIALS METHOD 9.1

PLANT INSPECTION OF PORTLAND CEMENT CONCRETE

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PREFACE

It is the purpose of Materials Method 9.1 to describe Department practices involved in the plant inspection of portland cement concrete mixes. Full conformance with Materials Method 9.1 will provide uniform inspection procedures at the plant, thus minimizing the risk both to the Contractor and the Department of the placement of unacceptable concrete in the work. A secondary purpose is to provide proper documentation of the acceptability of the concrete as it leaves the plant.

It should also be noted that the inspection procedures outlined herein are, in fact, inspection procedures conducted on behalf of the purchaser (the Department) and are in no way to be construed as an assumption of responsibility by the Department for the production of acceptable material. Regardless of the depth of inspection or the details thereof, it remains the responsibility of the Contractor to furnish every batch of material in compliance with the Specifications. Although the inspection procedures detailed herein may appear quite comprehensive, they are limited to sampling rates practical for accomplishment by one individual. It is therefore possible, although not probable, for deliveries of unacceptable material to be made to the project. In such event, it is the responsibility of the Project Engineer to reject the unacceptable material whenever such accidents are apparent. It is also the responsibility of the Project Engineer to provide field inspection of the concrete as outlined in Materials Method 9.2 "Field Inspection of Portland Cement Concrete".

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A Plant Inspector may suggest methods for improvement of plant operations but he is not authorized to accept unacceptable material pending correction of the conditions which produced it; nor do such suggestions by the Plant Inspector bind the Department to the acceptance of material outside the Specifications in the event that the application of an Inspector's recommendation did not have the expected result.

The testing frequencies outlined in this method should be followed as closely as possible. However, it is recognized that in certain situations the Inspector must emphasize one test and/or inspection procedure to the detriment of others in order to insure correction of extreme plant deficiencies. Therefore, so long as the Regional Materials Engineer is kept informed and the situation is noted in his diary, the Inspector may deviate at times from strict conformance to these testing frequencies.

Materials Method 9.1 consists of four (4) Sections and Appendices. Sections 1 through 3 contain procedures that the Plant Inspector should use while inspecting and documenting the production of concrete. Section 4 describes the inspection and approval procedures performed normally by either the Regional Materials Engineer and his staff or by representatives of the Materials Bureau as indicated.

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SUMMARY OF ROUTINE INSPECTION ACTIVITIES

	ACTIVITY	MINIMUM REQUIREMENT	FORM USED	REFERENCE
Control Tests	Coarse Aggregate Gradation	1 test per 500 cy (Structural)* 1 test per 1000 cy (Pavement)*	BR 317	Appendix B
	Coarse Aggregate Cleanness	As necessary	BR 317	Appendix C
	Fine Aggregate Gradation Fine Aggregate Fineness Modulus	1 test per 500 cy (Structural)* 1 test per 1000 cy (Pavement)*	BR 317	Appendices D & E
	Aggregate Visual Identification	1 test per day	BR 317	Appendix F
	Aggregate Free Moisture Content	Fine - 1 test per day Coarse - As necessary	BR 317	Appendix G
Equipment Checks	Moisture Meter	Daily	Diary	Section 2-3.02
	Moisture Compensator	Weekly	-	Section 2-3.034
	Automation, Interlocks	Weekly	-	Section 2-3.036
	Recordation	Daily	-	Section 2-3.04
	Scale Accuracy Check	90 days	BR 191	Appendix H
	Meter Accuracy Check	90 days	Diary	Appendix I
Recordkeeping	Production Records	Daily	-	Section 3-3
	Issue Acceptance	Daily, each project	BR 316	Section 3-4

*At stated frequency, but not less than one test per day

SECTION 1

INTRODUCTION

1-1 GENERAL

All portland cement concrete ingredients shall be batched according to mix designs prepared by or approved by the Department. The materials used in the concrete shall be approved prior to their use.

All concrete intended for use on Department projects shall be batched, and mixed, when produced at a central mix plant, in approved plants. The concrete is normally produced under the inspection of a resident plant inspector assigned by the [illegible]is representative. When resident plant inspection is not feasible for small quantities produced at approved plants for any use, except structural and pavement placements, the concrete may be accepted based on a producer's certification that the concrete meets specifications. For small quantities of structural or pavement concrete, the Project Engineer shall provide an inspector when a resident plant inspector is not available.

The concrete shall be delivered to the project and point of deposition in approved mixing and/or haul units.

1-2 INSPECTION PROGRAM

The Department uses an inspection program which inspects the portland cement concrete as it is manufactured at the plant to assure good quality material. This minimizes the risk both to the Department and the Contractor of placing unacceptable concrete in the work. A secondary purpose is to provide proper documentation of the acceptability of the concrete as it leaves the plant.

Although the inspection procedures are comprehensive, they are limited to sampling rates practical for accomplishment by one individual. It is therefore possible, although not probable, for deliveries of unacceptable material to be made to the project. In such event, it is the responsibility of the Project

Engineer to reject the unacceptable material whenever such accidents are apparent.

It is recognized that in certain situations one individual must emphasize one test and/or inspection procedure to the detriment of others in order to insure correction of extreme plant deficiencies. When this happens, the Inspector may deviate from strict conformance to these testing frequencies providing that he notes these situations in his diary.

1-3 PLANT INSPECTOR'S RESPONSIBILITY

The portland cement concrete may be mixed at the plant, at the placement site or in transit depending upon the type of mixing and delivery system that is used. The Plant Inspector's responsibility is confined to inspecting the operations that take place at the plant. Once the mixer or haul unit leaves the plant site, the Project Inspector assumes the responsibility of inspecting the operation from thereon.

The Plant Inspector is particularly responsible for assuring specification compliance by the Producer by performing the following inspection duties:

1. Assuring that only approved materials are incorporated in the concrete.

2. Inspecting plant production to provide assurance that the materials incorporated in the concrete are properly proportioned.

3. Inspecting plant equipment, mixers, haul units and operating procedures to assure uniform production.

4. Maintaining production records and other administrative procedures.

1-4 INFORMATION SOURCES

A Plant Inspector, in order to be effective, must be aware of all the pertinent criteria related to his work. This Section makes reference to the various sources of information, in addition to this Method, that must be consulted by the Inspector.

SOURCE	INFORMATION
Specification Book (including all addenda)	Material Requirements; Concrete Batching Plant Requirements; Handling, Measuring and Batching Materials; Concrete Mixing and Transporting
Approved Products List	Air Entraining Agents; Set Retarding Admixtures; Water Reducing Admixtures; Manufacturers of Portland Cement
Approved Aggregate Source Listing	Aggregate Source Numbers; Aggregate Test Numbers; Aggregate Specific Gravities; Aggregate Absorptions
Materials Methods 10, 10.1, 10.3	Portland Cement Inspection and Sampling of Cement at Batch Plants
Materials Method 18.1	Sample Transmittal Instructions

INSPECTOR'S CHECKLIST

1. Do you understand your responsibilities?

2. Do you have the required sources of information?

SECTION 2

CONCRETE PRODUCTION INSPECTION

2-1 GENERAL

This section describes the procedures that the Plant Inspector shall use for inspecting, testing and controlling the batching and mixing of portland cement concrete. Inspection procedures relating to approval of equipment by the Regional Materials Engineer or his representative are covered in Section 4.

Before any concrete production begins, the Plant Inspector should have in his possession information concerning the following items:

1. Annual plant approval with noted limitations
2. Mix design (Either design sheet or computer printout)
3. Explanation of symbols used for recordation purposes
4. Aggregate certifications
5. Aggregate absorptions

2-2 MATERIALS

The Plant Inspector shall inspect the plant operations to assure the Department that only approved materials are incorporated in the concrete.

2-2.01 Aggregates

The aggregates used in the production of portland cement concrete shall be approved for quality prior to their use. The gradation (including fine aggregate fineness modulus), cleanness and moisture content shall be determined at the plant for acceptance and/or control. The aggregate gradation control procedures in this manual are established to control the aggregate by testing during production. However, the Regional

Materials Engineer may choose to perform gradation (including fine aggregate fineness modulus) and cleanness tests on the aggregate as the stockpiles are made at the plant. When acceptance tests are performed while the stockpile is being made, the aggregate gradations shall be within specifications for each size in order for the stockpile to be accepted. For either method of acceptance testing, the sampling and testing procedures and the test frequencies shall be the same. The test frequencies for stockpile acceptance shall be equivalent to those given for concrete production in Section 2-2.014, Aggregate Tests.

2-2.011 Evidence of Acceptability

Each Contractor or Concrete Producer shall submit to the Department prior to production a certification indicating that both coarse and fine aggregates to be incorporated into the work are from approved sources. This certification shall be resubmitted annually. It shall be prepared and signed by a representative of the Contractor or Concrete Producer and it shall contain the following information for all coarse and fine aggregates:

1. Source Name and Number

2. Test Number

   Typical Test Numbers
   74AF103 (Fine Aggregate)
   74AR 94 (Crushed Stone)
   74AG17C (Crushed Gravel)

3. NYS DoT Size Designation

A new submission of a certification is required whenever any of the following occur:

1. When a different aggregate source is used.

2. When additional aggregate sizes are introduced that have not already been included in the previous certifications for the year.

In addition to source certification, it may be necessary to require a delivery ticket to identify aggregates arriving at the plant site. Those concrete suppliers, receiving aggregate from more than one source, which cannot be differentiated by the Aggregate Visual Identification Test (Appendix F), may at the option of the Regional Director be required to provide a delivery ticket with each shipment of incoming aggregates. This ticket or a legible copy shall be kept on file by the Concrete Producer and available for inspection by the Department.

When used, the delivery ticket shall contain the following information:

1. Source Name and Number

2. NYS DoT Size Designation

3. Name and location of supplier if different from the aggregate source.

4. Quantity

2-2.012 Aggregate Stockpiles

Department approved aggregates shall be stockpiled separately from non-approved aggregates on bases approved by the Regional Materials Engineer. The base shall have adequate drainage and may be formed from aggregates, concrete, metal or wood. The stockpiles shall be made so that aggregate of different sizes and from different sources are separated and contamination from adjacent stockpiles is not possible. If necessary, the Regional Materials Engineer may require that the stockpiles be clearly marked for identification.

2-2.013 Aggregate Sampling Procedures

Samples of aggregate may be taken from stockpiles, conveyor belts or from bin sampling devices installed in the batching plant. The selection of the sampling point for each plant shall be made by the Regional Materials Engineer. In general, aggregates should be sampled as close to the end of the batching process as practical. Samples for daily control testing, or any special testing purpose, shall be taken using procedures

outlined in Appendix A, Sampling of Aggregates.

2-2.014 Aggregate Tests

The Plant Inspector shall be responsible for sampling aggregates at various frequencies and performing tests to verify that the aggregates are within specification compliance. The tests shall be performed continuously at the prescribed testing frequency regardless of the class of concrete being produced.

The tests listed below are those performed by the Plant Inspector while the plant is in routine operation. A summary listing the frequencies of these test and other pertinent information is given in the front part of this manual.

Coarse Aggregate Gradation
Coarse Aggregate Cleanness
Fine Aggregate Gradation
Fine Aggregate Fineness Modulus
Aggregate Visual Identification
Aggregate Free Moisture Content

a. Coarse Aggregate Gradation Test

Well-graded coarse aggregates are necessary to produce satisfactory concrete. The gradation also needs to be uniform because large fluctuations drastically affect the workability of the mix, the mix water requirement and the amount of paste need to bind the aggregates together. The Department's specifications for concrete coarse aggregate gradations are designed to provide suitable workability, strength and durability.

The coarse aggregate gradation test procedure is outlined in Appendix B, Coarse Aggregate Gradation Test. The gradation of each aggregate component that is batched separately shall be determined and then the combined gradation of all coarse aggregates shall be determined mathematically. The action that shall be taken by the Plant Inspector as a result of the test is given in the gradation control procedures outlined in Section 2-2.015, Aggregate Gradation Control.

Routine Test Frequency - Minimum of one (1) test per 500 cubic yards structural or 1000 cubic yards pavement of concrete production or major fraction thereof, but at least one test per day.

b. Coarse Aggregate Cleanness Test

Coarse aggregates that contain deleterious (minus No. 200) material (silt, clay, rock flour, etc.) due to the lack of or inadequate washing may cause low concrete strength and poor durability. The coarse aggregate cleanness test is performed to determine the amount of minus No. 200 material.

The coarse aggregate cleanness test procedure is outlined in Appendix C, Coarse Aggregate Cleanness Test. The action that shall be taken by the Plant Inspector as a result of the test is the same as that for fine aggregate gradation and this is given in the aggregate gradation control procedures outlined in Section 2-2.015, Aggregate Gradation Control.

Routine Test Frequency - Any time a coarse aggregate appears dirty to the Plant Inspector. If a coarse aggregate is within 0.2% of the maximum specification limit on the minus No. 200 material, a minimum testing frequency of one test per day shall be started.

c. Fine Aggregate Gradation Test

Large variations in the fine aggregate gradation have a marked affect on the workability and finishing properties of the concrete. The variations also affect the air entraining capabilities of the concrete mixture; for example, excessive amounts of minus No. 100 and No. 200 material will often reduce the capability of the concrete mixture to entrain air.

The fine aggregate gradation test procedure is outlined in Appendix D, Fine Aggregate Gradation Test. The action that shall be taken by the Plant Inspector as a result of the test is given in the aggregate gradation control procedure outlined in Section 2-2.015, Aggregate Gradation Control.

Routine Test Frequency - Minimum of one (1) test per 500 cubic yards structural or 1000 cubic yards pavement of concrete production or major fraction thereof, but at least one test per day.

d. Fine Aggregate Fineness Modulus Test

The fineness modulus of an aggregate is an index used to express the relative coarseness or fineness of its particles. The higher the fineness modulus, the coarser the aggregate. The Department's concrete mix design includes the fineness modulus as part of its criteria.

The fineness modulus shall be determined each time the fine aggregate gradation test is performed. The fine aggregate fineness modulus test procedure is outlined in Appendix E, Fine Aggregate Fineness Modulus Test. If the average of the three (3) most recent test results has changed by more than 0.20 from the value used in the mix design, mix design adjustments shall be made by the Regional Materials Engineer.

e. Aggregate Visual Identification Test

The aggregate visual identification test is performed to assure the Department that the aggregates certified by the Concrete Producer are actually being used. The test is a visual comparison between the aggregates being used and a control sample prepared from material from the certified source. The test shall be performed by the Plant Inspector in conjunction with coarse and fine aggregate gradation tests. The minimum frequency shall be one test per day.

The test procedures for the aggregate visual identification test are outlined in Appendix F, Aggregate Visual Identification Test. If the Plant Inspector detects a difference in color or particle shape, which indicates a change in the aggregates, the Inspector shall contact the Regional Materials Engineer. The Materials Engineer shall initiate action to assure the Department that the certified aggregates are being supplied.

f. Aggregate Free Moisture Content Test

The concrete mix design (batching weights) is computed based on a saturated surface dry condition of all aggregates. Adjustments shall be made in the batching weights of sand, coarse aggregate and water to maintain the correct proportions of materials as the moisture in the aggregates vary.

The portland cement concrete batching plants are equipped with a moisture meter that measures the moisture in the fine aggregate bin. This meter provides a continuous reading of the free moisture (in excess of saturated surface dry) in the sand. The accuracy of the moisture meter shall be checked by the Plant Inspector by comparing the meter reading with the results of the moisture content test.

The aggregate moisture test procedure is outlined in Appendix G, Aggregate Free Moisture Content Test. The minimum frequencies which the moisture content shall be determined are as follows:

Aggregate Size	Min. Frequency
Fine Aggregate	Daily
Coarse Aggregate	As Necessary

The frequency of the moisture testing shall be increased if visible signs indicate that aggregate moisture contents are variable. This would include a change in aggregate processing, after rainstorms, etc.

An adjustment shall be made in the batching weights when the moisture varies in the fine aggregate by more than one-half (1/2) percent as indicated on the moisture meter. When the moisture content varies by more than one (1) percent from the design value in the coarse aggregate, the Plant Inspector shall notify the Materials Engineer.

If the fine aggregate has a free moisture content in excess of eight (8) percent, the fine aggregate shall not be used until the moisture stablizes below 8 percent.

2-2.015 Aggregate Gradation Control

The aggregate gradation control shall be based upon the results of the aggregate gradation tests performed according to the procedures and at the frequencies given under Section 2-2.014, Aggregate Tests. Any time visual inspection or test results indicate that the gradation of the aggregate has changed, testing frequencies shall be increased to closely control the situation.

The concrete batching plant shall operate under one of three Phases - Phase I (Routine Production), Phase II or Phase III. The phase in which the plant will be operating at any point in time will depend upon its ability to batch aggregates within the gradation specification limits. There are certain concrete placements that require a steady supply of concrete, for example a bridge deck placement. It is often within the best interest of the State to continue the placement, once it has started, even though the aggregate gradation is outside the specification limits, providing that the properties of the concrete mixture given in the mix design are met.

The Phases are defined below and are shown diagrammatically in Figures 1 and 2. Placements can start only when the plant is in a Phase I condition for fine aggregate and in either a Phase I or II condition for coarse aggregate.

PHASE I OPERATION (ROUTINE PRODUCTION)

A concrete batching plant is in Phase I operation when the gradation of the individual stockpiles are within their respective specification limits and the combined gradation is in the general limits. The gradation limits for the individual coarse and fine aggregates are given in Sections 703-02 and 703-07, and the concrete general limits in Section 501 of the General Specifications unless otherwise specified on the project plans or in the proposal.

If the coarse aggregate gradation test results show that either the stockpiles or the combined gradation is outside of the specification limits, the Plant Inspector shall notify the Producer, then immediately resample and retest the stockpile(s) in question. Depending on the results of the retest, the production will either remain in Phase I or enter Phase II or Phase III as indicated in Figure 1.

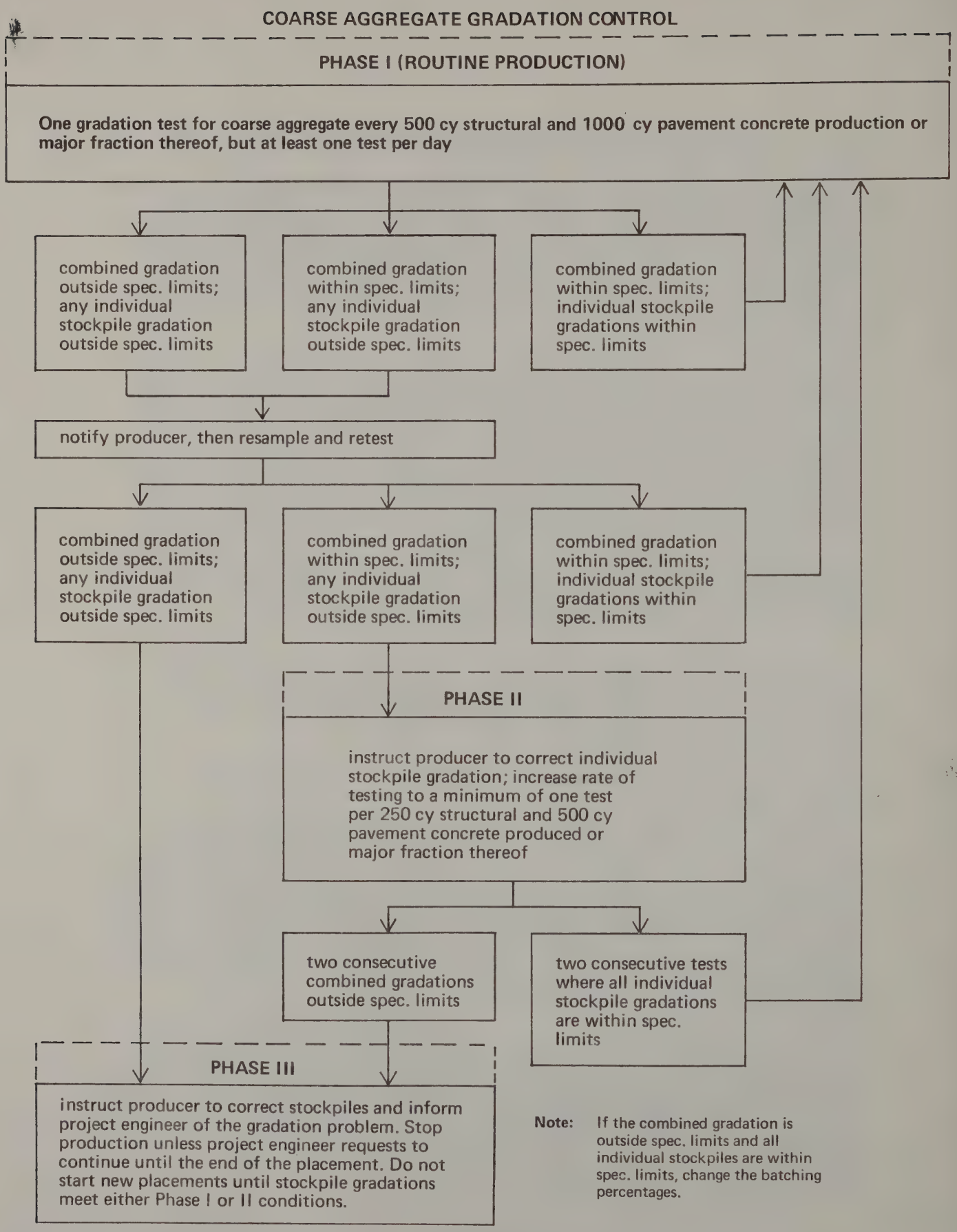

COARSE AGGREGATE GRADATION CONTROL
PHASE I (ROUTINE PRODUCTION)
One gradation test for coarse aggregate every 500 cy structural and 1000 cy pavement concrete production or major fraction thereof, but at least one test per day
combined gradation outside spec. limits; any individual stockpile gradation outside spec. limits
combined gradation within spec. limits; any individual stockpile gradation outside spec. limits
combined gradation within spec. limits; individual stockpile gradations within spec. limits
notify producer, then resample and retest
combined gradation outside spec. limits; any individual stockpile gradation outside spec. limits
combined gradation within spec. limits; any individual stockpile gradation outside spec. limits
combined gradation within spec. limits; individual stockpile gradations within spec. limits
PHASE II
instruct producer to correct individual stockpile gradation; increase rate of testing to a minimum of one test per 250 cy structural and 500 cy pavement concrete produced or major fraction thereof
two consecutive combined gradations outside spec. limits
two consecutive tests where all individual stockpile gradations are within spec. limits
PHASE III
instruct producer to correct stockpiles and inform project engineer of the gradation problem. Stop production unless project engineer requests to continue until the end of the placement. Do not start new placements until stockpile gradations meet either Phase I or II conditions.
Note: If the combined gradation is outside spec. limits and all individual stockpiles are within spec. limits, change the batching percentages.

FIGURE 1

If the fine aggregate gradation test results show that the stockpile is outside of the specification limits, the Plant Inspector shall notify the Producer, then immediately re-sample and retest the material. Depending on the results of the retest, the production will either return to Phase I or be stopped unless the placement must continue (Phase III) as indicated in Figure 2.

PHASE II OPERATION

Phase II concerns only the coarse aggregate gradations. This condition occurs when the individual stockpile gradations are outside of their respective specification limits, but the mathematically combined gradation is within the specification limits given in Section 501 of the General Specification or otherwise indicated in the project proposal.

The Plant Inspector shall take the following steps when a plant enters the condition of Phase II operations:

1. Inform the Producer that he is in Phase II condition and that he must start taking the necessary steps to return to the Phase I operation.

2. Inform the Regional Materials Engineer

3. Increase the sampling and testing frequency to a minimum of one test for every 250 cubic yards (structural) and 500 cubic yards (pavement) of concrete produced or fraction thereof.

The length of time that the plant can operate in the Phase II condition shall be subject to the approval of the Regional Materials Engineer.

PHASE III OPERATION

If two consecutive coarse aggregate gradations tests show that the combined gradation or a combination of combined gradation and an individual stockpile (Figure 1), or two consecutive fine aggregate gradations (Figure 2), fail to meet specification limits while the plant is in production, the plant shall be considered in a Phase III condition and production for Department work should stop. At this point the Inspector shall notify the Project Engineer or his representative that the plant

FINE AGGREGATE GRADATION CONTROL

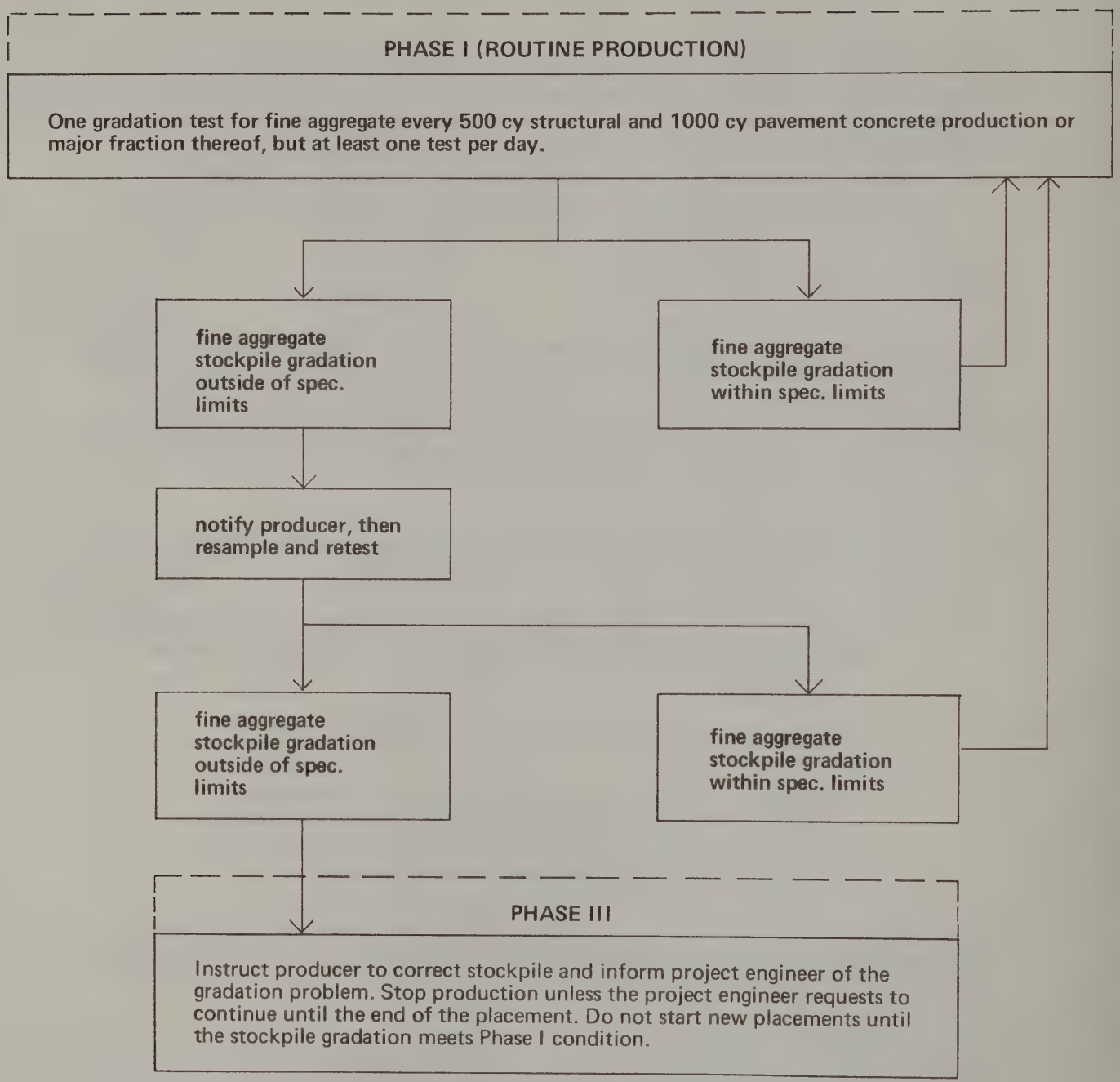


FIGURE 2

is in a Phase III condition and that the concrete production should be stopped until the problem is corrected.

If the Project Engineer considers that the placement is critical and it is within the best interest of the State to continue to use concrete from the plant, he may continue the placement and accept the responsibility for determining the acceptability of the concrete. This determination shall be made at the project in the following manner:

1. Conduct slump and air content tests according to Materials Method 9.2 for specification compliance on at least every two loads.

2. Check the placing and finishing operations for difficulties due to changes in workability, bleed water or other undesirable characteristics.

A plant may operate in the Phase III condition only to complete a concrete placement already in progress. The Producer shall not start producing concrete for new placements. Before concrete production can be resumed for new placements on any project(s), the Producer shall correct or replace the aggregates that are outside specification limits such that the requirements of Phase I or II operation are met.

2-2.02 Cement

Portland cement is supplied to the batching plant in bulk form transported usually either by truck or barge. The cement is either from mills where the manufacturing process has been approved by the Department or from mills where the cement has been tested and accepted by the Department before shipment.

2-2.021 Evidence of Acceptability

Cement from mills approved to supply Department work under a certification program must be accompanied by a Cement Shipment Certification form (BR-280) executed and signed by the manufacturer. These manufacturers are listed on an approved list published by the Materials Bureau.

Cement from mills approved to produce and supply only under Department inspection must arrive in a vehicle sealed by a Department representative and be accompanied by a Cement Shipment Authorization form (BR-44) executed by the Department representative.

The details concerning certification, inspection and documentation of portland cement are covered in Materials Method 10.0, 10.1 and 10.3.

2-2.022 Cement Control

Any portland cement that arrives at the plant without the proper evidence of acceptability shall not be used in Department work. The Plant Inspector shall periodically check the temperature of the cement, especially when the silo number changes and record it in his diary. If the temperature exceeds the shipping temperature given in Section 701-01 of the General Specifications, or at anytime the cement appears to be defective, the Plant Inspector shall notify the Regional Materials Engineer.

2-2.023 Cement Sampling

Cement shall be sampled according to Materials Method 10.0 for deliveries made under the cement mill certification program; and cement that is inspected and tested by the Department before shipment shall be sampled according to Materials Method 10.3.

All cement samples shall be sent to the Materials Bureau for testing with a BR-240 form completed by the Plant Inspector. Instructions for completing the BR-240 form are located in Materials Method 18.1.

2-2.03 Admixtures

2-2.031 Evidence of Acceptability

The acceptability of admixtures shall be determined by comparing the brand name located on the container to the approved admixture list published by the Materials Bureau.

This list is periodically updated to show which admixtures are currently approved. The Plant Inspector can check the status of any product not on the list by contacting the Regional Materials Engineer.

2-2.032 Admixture Control

Admixtures should be stored and handled such that freezing will not occur. If the quality of an approved admixture is determined "suspect" by the Plant Inspector due to freezing, separation, not yielding desired results etc., he shall contact the Regional Materials Engineer.

2-2.033 Admixture Sampling

Admixtures shall be sampled when requested by the Regional Materials Engineer. When samples are needed, they should be taken from the admixture delivery system bypass valve used for quantity calibration. The sample should be approximately one (1) quart and put into a clean, watertight container.

If samples must be taken directly from a large bulk storage tank, instructions on sampling should be obtained by the Regional Materials Engineer from the Materials Bureau.

All admixture samples shall be sent to the Materials Bureau for testing with a completed BR-240 form. Instructions for completing the BR-240 form are located in Materials Method 18.1.

2-2.04 Water

2-2.041 Evidence of Acceptability

Any water source that is used for human consumption shall be acceptable for the manufacture of concrete. Any other source shall be considered suspect and the Regional Materials Engineer should sample the water for testing if he has no experience with the source in question.

2-2.042 Water Sampling

A representative sample of water, approximately one gallon, shall be put in a clean watertight glass or plastic container. The sample shall be accompanied by a completed BR-240 form and sent to the Materials Bureau for testing. Instructions for completing the BR-240 form are located in Materials Method 18.1.

2-3 BATCHING

The Plant Inspector shall inspect the batching operations to assure the Department that the materials incorporated in the concrete are properly proportioned. The batching equipment is inspected annually and then periodically throughout the season by the Regional Materials Engineer or his representative. However, it is essential that the Plant Inspector is acquainted with all of the equipment and its operation in order to assure that the batching is being performed in the proper manner on a day to day basis.

2-3.01 Weighing Units and Measuring Devices

Aggregates and cement are proportioned by weight while water is proportioned by either weight or volume. Admixtures are proportioned volumetrically.

Each measuring device shall be tested to assure that the accuracy meets the requirements given in Section 501 of the General Specifications. The accuracy of the water scale shall be the same as that specified for the cement and aggregate scales. These devices shall be checked annually prior to use for Department work, at intervals of not more than ninety (90) days, at anytime a plant changes location, or at anytime chosen by the Regional Materials Engineer or Plant Inspector. The scale check procedures are outlined in Appendix H, Scale Accuracy Check, the water meter procedures are described in Appendix I, Meter Accuracy Check. Scale checks performed by a competent scales technician may be monitored by the Plant Inspector in lieu of performing his own scale check.

If the weighing unit or measuring device shows that the accuracy is not within specifications, the Plant Inspector

shall notify the Producer that the plant cannot produce concrete for Department projects until the device is corrected.

2-3.011 Scales

Scales are generally used to proportion the aggregates and cement. The aggregates usually are batched in a weigh hopper where the proportions are weighed cumulatively. The cement is batched in its own weigh hopper. Some plants, however, have separate weigh hoppers for weighing each aggregate proportion.

The scales will usually be the springless dial type. The dial type scales may at times have primary scales with repeating dials or digital displays at the operator's work station. Also dial type scales may have dual ranges - low and high. An example of a scale having a dual range is an aggregate scale having a maximum low range of 6000 pounds and a high range capacity of 30,000 pounds. The scale graduations would be 6 pounds and 30 pounds respectively. The high range is accomplished by a weight being added automatically to the lever system below the dial head. Each range shall be treated separately when checking the scale accuracy.

The Plant Inspector should periodically spot check the dual range scales to insure himself that the scales are operating in the proper range. Usually the yardage selector controls the range in which the scale is operating. As the selector is advanced above a given batch size, the scale advances to the high range. By advancing the yardage selector above and below the given batch size, the Inspector can observe if the scale switches to the proper range.

Some low volume manual control plants have beam scales as the weighing device. The beam scale is one of which the weights of loads of various magnitudes are indicated solely by means of one or more weighbeam bars either alone or in combination with counterpoise weights. The accuracy of the beam scales shall be determined according to the procedures outlined in Appendix H, Scale Accuracy Check.

When cement is blown into the storage silo, the vent in the silo must be working properly. If the vent is plugged, the pressure build-up in the silo may cause the cement scale to

give an erroneous reading during the batching of cement. Therefore, the Plant Inspector should periodically observe the cement scale as the cement is being blown in.

2-3.012 Meters and Other Volumetric Measuring Devices

Meters are usually used to proportion admixtures and water. Admixture dispensing systems are part of the specified equipment in all plants; and water meters are used at central mix plants and very often at transit mix plants.

a. Admixtures

Preset quantities of admixture shall be pumped from the storage facility through a volumetric measuring device and discharged in such a manner that will give a uniform distribution of the material throughout the mixture within the specified mixing time. Generally the admixtures are discharged separately into the fine aggregate bin of the weigh hopper or into the water line. Do not permit different types of admixtures to come into direct contact with each other.

The admixture dispensing system shall be equipped with a by-pass valve suitable for determining the accuracy of the system. The accuracy shall be within the delivery tolerance given in Section 501 of the General Specifications. The procedure for determining the accuracy of the admixture dispensing system is given in Appendix I, Meter Accuracy Check.

b. Water

The accuracy of the water meter shall be within one (1) meter graduation and the procedures for determining the meter accuracy are given in Appendix I, Meter Accuracy Check. In some automatic control proportioning systems, the meter is connected to a moisture compensation device which adjusts the amount of water delivered to accommodate the free moisture in the fine aggregate. The moisture compensation device shall be set at zero when performing the accuracy check.

The types of water delivery systems normally encountered are as follows:

1. Manually metered by the Operator.

2. A preset quantity is delivered when the Operator pushes a button.

3. Metered automatically by controls which also adjusts for batch sizes, mix type, etc. (common to central mix plants).

2-3.02 Moisture Meter

Each batching plant shall be equipped with a moisture sensing device that indicates on a readily visible scale or chart the free moisture content of the fine aggregate as it is batched. The Plant Inspector shall check the moisture meter daily by conducting a free moisture test on the fine aggregate as outlined in Appendix G, Aggregate Free Moisture Content Test and comparing the results to the meter reading. The moisture meter shall be adjusted to match the free moisture content of the fine aggregate by the Producer if the difference between the two exceed 0.5 percent.

2-3.03 Automatic Proportioning Controls

Automated control plants shall be equipped with an automatic proportioning and cycling system to measure the quantity of aggregates, cement, admixtures and sometimes water. The batching control automatically draws materials in a selected sequence and in the amount of the programmed weights or volumes set into the system by the Operator. After each material is drawn, except water, the system automatically checks to determine if the quantity is within the batching or delivery tolerances given in Section 501 of the General Specifications. Whenever a weighing error in batching occurs (outside the batching interlocks), the automatic cycle shall be interrupted until corrective action is taken.

Automatic proportioning systems generally draw the aggregates and cement until the programmed (cut-off) weights are reached before the batching tolerance check is made by the system.

However, some systems are designed to batch to or seek the "underweight" cut-off point (see Figure 4). These systems are not allowed an underweight batching tolerance, thereby forcing the system to seek the programmed weight.

The admixture dispensing system shall be interlocked with the automated proportioning equipment so that the quantity of admixture preset into the system has been batched and discharged. Otherwise the automatic cycle shall be interrupted.

When water is batched automatically at the plant, the water shall be drawn until the programmed weight or volume is satisfied. The water batched at central mix plants shall be batched to the batching tolerance given in Section 501 of the General Specifications; however, no other requirements for batching tolerances or interlocks exist.

2-3.031 Batching Control Panel

The major components of the batching control panel and their function are described in this section. In order to explain the features of the panel and their purpose, a hypothetical control panel is shown in Figure 3. The panel is a composite of many systems and no plant should be expected to have a panel with all of these features. The features described below are identified in the figure by corresponding numbers.

1. Bin Level Indicators - Indicates the approximate level of the material in the bin. The sensing devices are usually located at the lower quarter point of the bins.

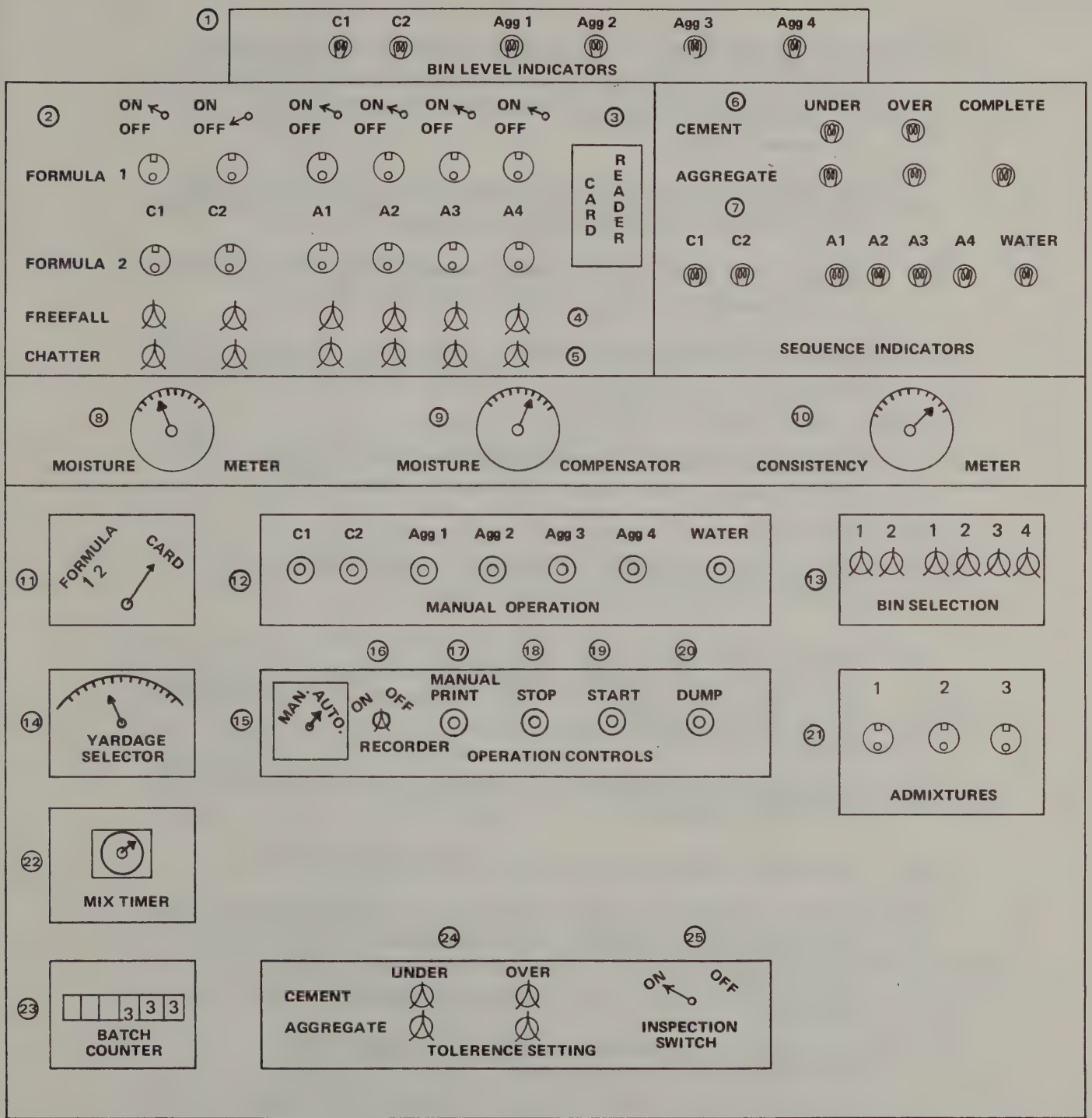
2. Preset Dials (or Batch Plugs) - Two methods to preset design batch weights into the control panel.

3. Card Reader - Reads formula card to preset design batch weights into the control panel.

4. Freefall Control - Aggregate and cement batcher gates are closed prematurely to allow for material in mid-air suspension. This device provides accurate weighing.

5. Chatter Bite (Jog) Control - Adds material from the bin slowly to bring weight in weigh hopper up to programmed weight.

AUTOMATIC BATCHING CONTROL PANEL



KEY

- SWITCH
- KNOB
- LIGHT
- PUSH BUTTON
- PRESET

FIGURE 3

6. Under-Over Lights - Indicates whether the weight of a particular aggregate or cement is under or over the interlock settings (batching tolerance) of the programmed weight.

7. Sequence Indicators - Various lights indicate when certain batching operations are under way or complete.

8. Moisture Meter - Indicates the approximate percentage of free moisture in the fine aggregate.

9. Moisture Compensation Dial - Corrects the programmed (design) batch weights to account for free moisture in the fine aggregate.

10. Consistency Meter - Used only in central mix plants to indicate approximate slump of concrete in the mixer.

11. Formula-Card Switch - Controls batching by card reader or presets.

12. Manual Draw Controls - Manual controls to draw cement, aggregates and water. Lights are sometimes incorporated in these controls that indicate batch progress during automatic batching.

13. Bin Selection Switches - Controls the order of the bin that aggregates are drawn from.

14. Yardage Selector - Controls the batch size.

15. Automatic-Manual Control - Control for setting type of batching operation. In "automatic" all operations are automatic. In "manual" all operations are controlled manually by means of individual push buttons.

16. Recorder Control - Actuates the recorder.

17. Manual Print - Actuates the recorder to print an individual weight.

18. Emergency Stop - Stops operation at any time in the cycle.

19. Start - Master control to start batching operation.

20. Batch-Dump - Manual control to discharge weighed material.

21. Admixture Controls - Controls the batching and discharging of programmed amounts of admixtures.

22. Mix Timer - Controls time of mixing in central mix plants.

23. Batch Counter - Accumulates number of batches produced.

24. Interlock (Batching Tolerance) Settings - Sets an acceptable batching range for each material being weighed.

25. Inspection Switch - Stops cycle at the next batching point (after switch is thrown) so that the accuracy of batching and tolerance settings can be inspected.

2-3.032 Formula Setting Controls

The automatic proportioning systems have one or a combination of formula setting controls. Dial presets in conjunction with a card reader is one of the popular combinations. The various types of controls are described below:

a. Dial Presets

Cement and aggregate design weights for each bin are set on the preset dials. These weights may be an individual bin draw weight or a cumulative weight. The formulas may be set for a full batch, a one-yard batch, or some point in between, depending on the particular system. Admixture quantities and water weight or volume are set in the same manner.

b. Punch Type Card Reader

Bin draw weights, water weights or volume when batched, and admixture quantities are punched on a card using a hand punch or special card punching

device. In some systems, all spaces are punched except those that combine to give the proper weight. The prepared card is then inserted into a card reader on the control panel.

c. Slot Type Card Reader

Slots are cut in a card and the depth of the slots indicate the weight or percent of material required. The prepared card is then inserted into a card reader on the control panel.

d. Batch Plug

A plug consisting of several potentiometers enclosed in a casing is inserted into a receptacle in the control panel. The control system is put in "calibrate position" and the scale is set manually at the required design weight for the first material. The potentiometer in the plug corresponding to this bin is adjusted with a screwdriver until the "calibration light" goes out. This procedure is followed for succeeding materials. Once the batch plug is calibrated, it can be removed and reinserted at a later time without recalibrating. However, the batch plug should be checked periodically to insure that no changes in the programmed batch weights have occurred.

e. Blind Presets

Blind presets are set and operate exactly the same as batch plugs but are permanently fixed to the panel. They essentially are presets without dials. Blind presets are not conducive to rapid formula changes.

2-3.033 Freefall Compensation and Chatter Bite Controls

Most systems have controls to allow for material in mid-air suspension. These are called "freefall" or "suspension compensators". These controls slow down or prematurely stop the draw of materials so the amount of falling material is compensated for in weighing or metering. These controls shall be adjusted for each component by trial and error

during production.

The chatter bite control is an adjustable timing device that opens and closes the bin gates in a jogging fashion. This permits the weigh hopper to accumulate more material automatically to meet the programmed weight when the initial weighing is below the underweight tolerance.

2-3.034 Moisture Compensation Device

Although not required, some plants have a moisture compensation device that adjusts the programmed weights of fine aggregate and water, when batched, to account for the free moisture in the fine aggregates. This control consists of a dial or preset that is manually set to the free moisture content indicated by the moisture meter. No adjustments are made by this device for free moisture in the coarse aggregates.

The moisture compensating device shall be checked by the following steps:

1. Set the design weight for the fine aggregate in the control panel.

2. Set a moisture reading on the moisture compensator.

3. Determine if the automation equipment adjusts the fine aggregate weight for the amount of free moisture indicated on the moisture compensator. This adjustment must be within one scale graduation of the desired reading.

4. Repeat the above steps for moisture contents throughout the working range of the device.

2-3.035 Batching Tolerances

Batching tolerances for all the materials are given in Section 501 of the General Specifications. These tolerances shall be applied to each batching formula and the acceptable batching range for each weight shall be determined.

The cement, admixture(s) and water batching tolerances shall be based upon the total amount of the respective materials in the batch. The aggregate batching tolerance, however, depends on whether the aggregates are weighed in a cumulative weigh hopper or in individual weigh hoppers. When aggregates are batched in a cumulative weigh hopper, the tolerance shall be based on the total weight of aggregate. When aggregates are batched in individual weigh hoppers, the tolerance shall be based on the individual aggregate weights.

Since the allowable batching tolerances vary with batch size, some automation systems automatically vary the batching tolerance interlock settings when a change is made in the yardage selector setting. Plants that do not have the batching tolerance interlock control tied in with the yardage selector are usually set for the minimum allowable batching weights. This is for convenience.

The minimum allowable batching weights for aggregates and cement are determined by either the Materials Bureau or the Regional Materials Engineer. The procedure for determining these weights is given in Section 2-3.06, Minimum Batch Size. The minimum allowable batch weights are also recorded on the form BR-180, Annual Inspection Record - Portland Cement Concrete Batch Plant.

The zero tolerance is the scale or meter condition that must be satisfied before batching can start. The zero tolerance shall be the same as the batching tolerances and they shall be based upon the minimum allowable batch weights at all automated batching plants.

Examples are given to illustrate the determination of allowable batching tolerances for the two aggregate weighing systems.

Example 1: The batching plant is an 8 cubic yard plant with a cumulative aggregate weigh hopper. The minimum allowable batch weights from the BR-180 are as follows:

aggregate:	4000 lbs.
cement:	1000 lbs.

Determine the batching and zero tolerances and the acceptable batching range for each weight.

Aggregate Batching Tolerance

Assume 3000 lbs. of aggregate per cubic yard

Therefore, the tolerance for the 8 cubic yard batch is 8 x 3000 x 0.02 = $\pm$ 480 lbs.

Cement Batching Tolerance

Assume 600 lbs. of cement per cubic yard

Therefore, the tolerance for the 8 cubic yard batch is 8 x 600 x 0.01 = $\pm$ 48 lbs.

Zero Tolerance

Aggregate: 4000 lbs. x 0.02 = 80 lbs.
Cement: 1000 lbs. x 0.01 = 10 lbs.

Batching Weights with Tolerances

Material	Cumulative Weight	Tolerance	Acceptable Range
Agg. 1	8000	$\pm$480	7520- 8480
Agg. 2	16000	$\pm$480	15520-16480
Agg. 3	24000	$\pm$480	23520-24480
Cement	4800	$\pm$48	4752- 4848

Example 2: The batching plant is an 8 cubic yard plant with an individual weigh batcher for each aggregate. The minimum allowable batch weights from the BR-180 are as follows:

aggregate: 1000 lbs. - each scale
cement: 1000 lbs.

Determine the batching and zero tolerance and the acceptable batching range for each weight.

Aggregate Batching Tolerance

Aggregate Batcher	Weight	Tolerance	Weight Tolerance
1	8000	0.02	±160
2	9600	0.02	±192
3	7200	0.02	±144

Cement Batching Tolerance

Assume 600 lbs. of cement per cubic yard

Therefore, the tolerance for the 8 cubic yard batch is 8 x 600 x 0.01 = ± 48 lbs.

Zero Tolerance

Aggregate - each scale: 1000 lbs. x 0.02 = 20 lbs.
Cement: 1000 lbs. x 0.01 = 10 lbs.

Batching Weights with Tolerances

Material	Individual Weight	Tolerance	Acceptable Range
Agg. 1	8000	±160	7840-8160
Agg. 2	9600	±192	9408-9792
Agg. 3	7200	±144	7056-7344
Cement	4800	±48	4752-4848

2-3.036 Batching Interlocks

All automatic batching control systems shall have interlocks to provide assurance that the batched quantities of aggregates, cement and admixture are within specifications. The interlocks shall interrupt the cycle whenever an error occurs during any of the following batching functions:

1. Weighing the aggregate and cement.

2. Scale or meter fails to return to zero tolerance.

3. Measuring and discharging the admixture.

4. Recording the batched quantities of aggregate and cement and the indication that the admixture was properly batched and discharged.

5. Opening and closing of the holding bin gates and the weigh hopper discharge gate(s).

6. Mixing time on central mix plants.

a. Weighing Tolerance Interlocks

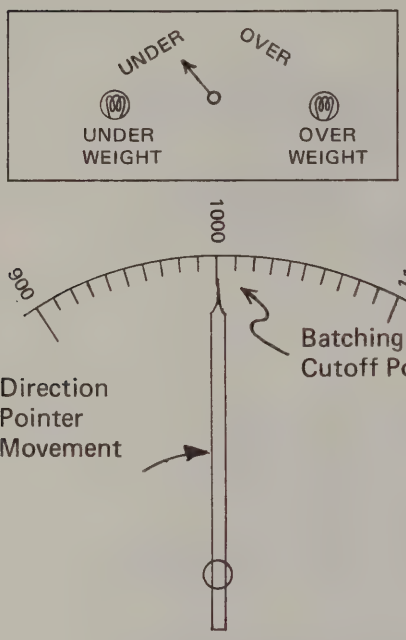
The weighing tolerance interlocks shall be set at the underweight and overweight cut-off points. In general, the underweight and overweight cut-off points will be equally distant from the programmed weight cut-off point. Some automation equipment, however, is designed to seek the programmed cut-off point as the material is being weighed and these plants do not have an underweight tolerance or interlock.

The interlocks shall not exceed the permissible tolerance by more than one scale or meter graduation. When plants produce different batch sizes, the tolerance interlocks shall be moved to tighten the tolerance range as the batch size decreases.

Some automation equipment have the interlocks tied into the yardage selector which automatically moves the interlocks to the appropriate tolerance range for the particular batch size. The plants that do not have this equipment feature shall be set at the tolerance range for the minimum allowable batch weights when varying batch sizes are produced. This is for operational convenience.

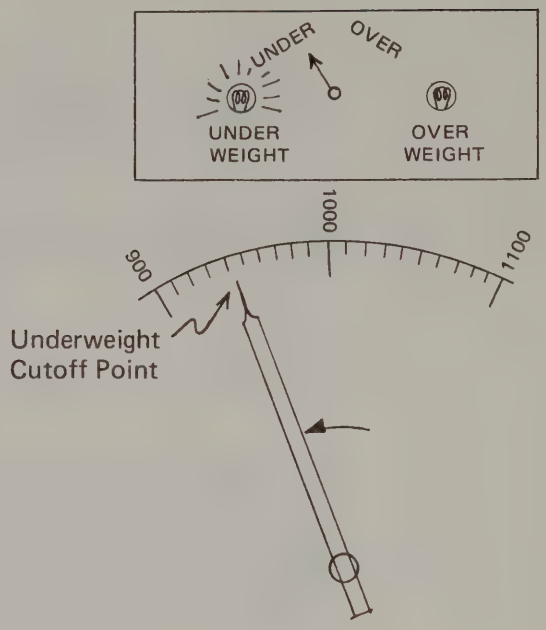
The procedure for checking the programmed weight cut-off point and setting the tolerance interlocks is given in Figure 4. This procedure requires the simulation of batching operations by moving the scale dial pointer manually. The scale dial pointer shall be advanced by the use of a device that applies pressure to the scale levers. Never grasp the scale dial pointer while the scale is connected to the scale lever system.

WEIGHING TOLERANCE INTERLOCK INSPECTION



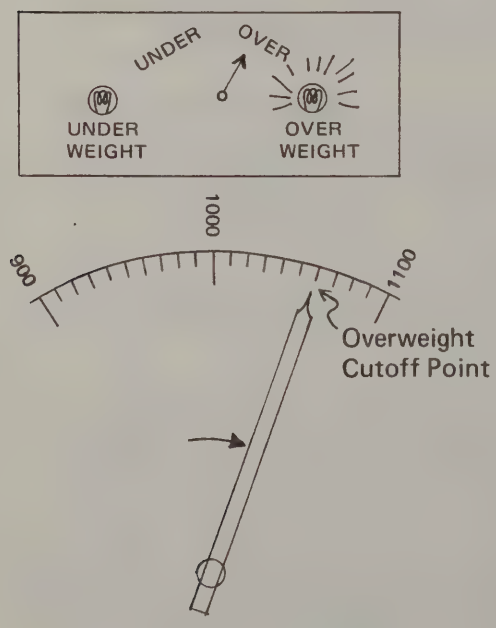
Step 1

Place inspection switch in "under" position. Advance pointer slowly to batching point until "under" light goes out. This is the batching cutoff point.*



Step 2

With switch in "under" position, move pointer slowly down scale until "under" light comes on. This is the underweight cutoff point.



Step 3

Place switch in "over" position and advance pointer slowly until "over" weight light comes on. This is the overweight cutoff point.

Step 4

Place switch in "under" and advance pointer to the next batching cutoff point and repeat steps 1, 2, 3 and 4 until check is complete.

Step 5

Move pointer slowly down scale and determine the zero cutoff point (zero interlock).

*In some systems, it may not be possible to determine the batching cutoff point unless the over and under tolerance are set at zero.

FIGURE 4

The yardage selector shall be checked by observing the programmed weight cut-off points and the underweight and overweight interlocks throughout the working range of the selector. All points shall be within one graduation of the desired cut-off points.

b. Zero Tolerance Interlock

The zero tolerance interlock prevents a new batch from being weighed until the weigh hopper is empty of the previous batch and the scale pointer has returned within the zero tolerance. The interlock shall be set at the zero tolerance based upon the minimum batched weights when varying batch sizes are produced.

The position of the interlock can be checked by holding the scale pointer above the zero tolerance and trying to start a new batch by pressing the "Auto Ready" or "Start" button. The interlock is okay if the new batch cannot be started.

c. Admixture Interlocks

The admixture dispensing system shall be interlocked with the automated system so that:

1. Aggregate and/or cement weigh hopper discharge gates cannot be opened until the programmed quantity of admixture has been satisfactorily batched or discharged.

2. The recordation of the presence of admixture shall be dependent upon the completion of the admixture discharge.

The interlocks generally associated with assuring that the quantity of admixture is batched and delivered are as follows:

When the admixture is metered and discharged simultaneously, the only interlock needed is the one that prevents the recorder from printing until the programmed quantity of admixture is delivered through the meter.

When the admixture is metered and stored in a holding vial, two interlocks are needed - one to assure that the programmed quantity has been delivered and another to assure complete discharge of the admixture from the vial. Again the recorder shall print only upon complete discharge of the vial.

When the admixture is batched in and discharged from a vial, two interlocks are needed - these are the same as metering the admixture in the holding vial except that both interlocks are in the vial.

The interlocks that are located in the vials are usually either float switches or electronic probes. The indication of the presence of admixture by the recorder may be a number, a letter or a combination of these two with a zero tare.

The admixture interlocks shall be checked by simulating batching operations to see if the interlocks are functioning properly.

d. Inlet and Discharge Gate Interlocks

The aggregate and cement inlet gates shall be interlocked with the automatic cycle so that they cannot open while the weigh hopper discharge gates are open. Also the weigh hopper discharge gates shall be interlocked so that they cannot be opened while the weigh hoppers are being filled with aggregates and cement.

The interlocks shall be checked by trying to activate these gates by simulating production. The holding bins should be empty when these checks are made. As the batching cycle is simulated, the Inspector can listen for the opening and closing of the gates. If the holding bins have material in them, the pressure to the air or hydraulic rams can be shut off and the Inspector can listen for the "click" of the solenoids that control the air rams or hydraulic pistons.

The weigh hopper discharge gates for aggregate and cement shall be interlocked so that they cannot be opened until the programmed quantity of cement, aggregate and admixture are within the batching tolerance. These interlocks can be checked by simulating the batching cycle. The admixture interlock can be simulated by disconnecting the delivery line from the storage tank or electrically activating the "low level" float switch, if present, in the system.

e. Mix Timer Interlocks (Central Mix)

Central mix plant shall be equipped with a mix timer(s) that is interlocked with the automation so that it will not let a batch of concrete be discharged until the specified mix time has elasped. Mixing time begins after all materials are in the drum.

The Inspector shall determine the accuracy of the timer and that the mixer and timer are properly interlocked. Depending on what activates the timer, the Inspector may have to determine such things as belt lag time, charging time, etc.

2-3.04 Recorders

Recordation equipment shall be used to provide the Department with a visual record of the materials incorporated into the concrete mixture. It shall be electrically connected to the scales, meters, and batching controls such that the quantities of each aggregate component, cement, water at central mix plants and the presence and type of admixture for each batch of concrete will be recorded. In addition, all records shall show the batch number, mix identification, the day, month, year and time of day to the nearest minute for each batch so that the batch is permanently identified.

The Producer has three options in regard to the type of recordation equipment. These options are digital recordation, ticket or tape, and graphical (strip-chart) recordation.

Some of the recorded information is in code form. Therefore, the Plant Inspector should have a sample record showing and explaining the codes used to represent various information at each plant.

2-3.041 Digital Recorders

The quantities and other batch information shall be printed by a printing calculator on either a ticket or a continuous tape. The principle difference between these two methods is that the ticket is a multicopy form with preprinted serial numbers and the tape recordation has a batch identification number printed for each batch. Figures 5 and 6 show a typical printed ticket and tape respectively.

The digital recordation shall contain the following information:

1. Individual aggregate identification and quantity
2. Cement quantity (also identification, if required)
3. Water quantity (central mix plants)
4. Presence and type of admixture
5. Time and date of batch
6. Mix identification
7. Batch number (ticket serial numbers)

When the printed digital record is used as, or part of, the delivery ticket, the Producer shall provide the State with two copies. One copy to go with the truck, the other for the Plant Inspector.

The resolution of the digital recorder shall be equal to or less than the scale graduations. The digital printers shall be checked for accuracy by holding the scale pointer at several points on the scale dial and manually causing the recorder to print. The weight printed on the recordation shall agree within one scale graduation of the weight indicated by the scale pointer. A good time to check the

DIGITAL TICKET

T. N. Trohs Concrete Co. Ticket No. 7

SOLD TO: _____

ADDRESS: _____ CU. YDS. _____

DT	091074			
TI	0851	DT	=	DATE
CN	103325	TI	=	TIME
JN	36041	CN	=	CUSTOMER NO.
MI	02	JN	=	JOB NO.
A5	4000	MI	=	MIX
A4	8000	A1,2	=	FINE AGGREGATES
A3	11500	A3,4,5,6	=	COARSE AGGREGATES
A1	14200	C1,2,3,4	=	CEMENTS
AT1	14200	W	=	WATER
C1	2480	AD1,2,3,4,5	=	ADDITIVES
AD1		AT1,2	=	AGGREGATE TOTALS
W*	1000			

Due On Job	Arrived On Job	Started Unload	Left Job	Arrived Plant

Total Drum Revolutions _____

Received By _____ Truck No. _____

FIGURE 5

DIGITAL TAPE

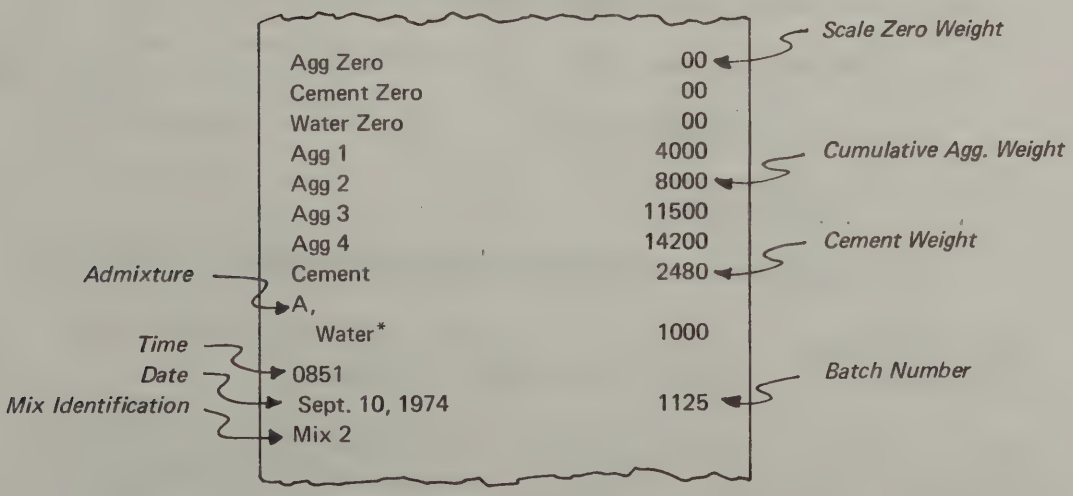


FIGURE 6

*Required on central mix plant only.

recorder is when the weight tolerance interlock check is made.

2-3.042 Graphic (Strip-Chart) Recorders

Graphic recorders show cement and aggregate weights by the use of moving pens that record the scale pointer movement on a moving chart. On most charts there are two moving pens - one for cement and one for aggregates. The presence and type of admixture is recorded usually in code form as shown in Figure 7. At central mix plants the quantity of water (pounds or gallons) is recorded by a third pen.

The strip-charts are designed such that all quantities, including zero, can be read directly. The resolution of the chart shall not exceed twenty-five (25) divisions per inch. Each division shall represent a quantity not greater than the allowable batching tolerance of the material being batched.

The information required on the graphical record shall be as follows:

1. Graphical trace showing:
   Individual aggregate draw weights
   Cement draw weight
   Water quantity (central mix plant)

2. Presence and type of admixture

3. Mix identification

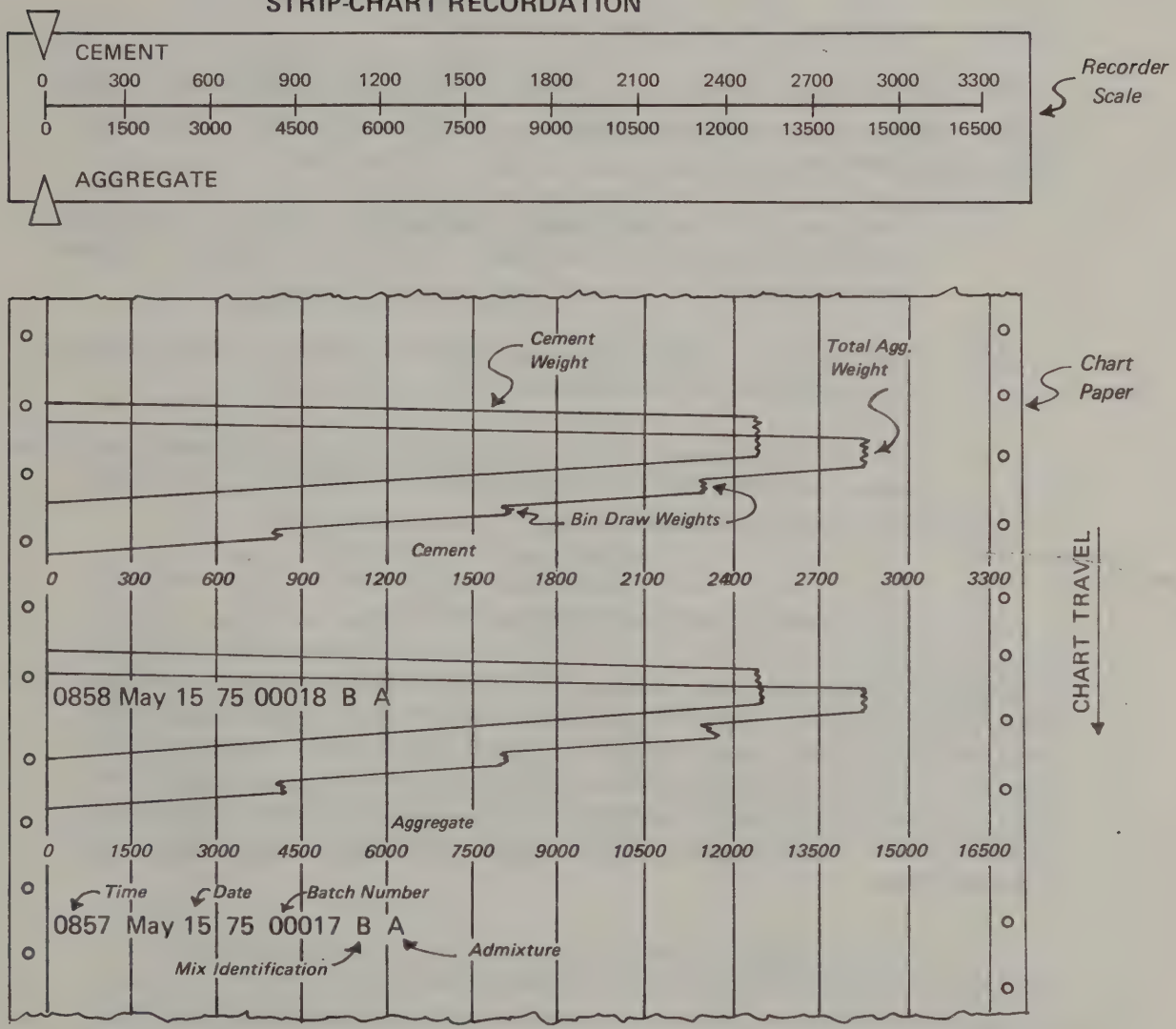
4. Batch number

5. Automatically applied time - date

In some cases the water at central mix plants may be recorded by a separate digital recorder.

The graphical recorder shall be checked for accuracy by holding the scale pointer at several points (zero, 1/4, 1/2, 3/4 and full range) on the dial and observing the position of the pen. The weight shown on the chart shall agree with the weight on the scale within one-half (1/2)

STRIP-CHART RECORDATION



NOTE: The time-date and batch number stamp for a particular batch is a distance of 3 inches ± below the batch trace.

FIGURE 7

division of the chart paper.

2-3.05 Batching Inspection and Control

The Plant Inspector shall perform routine inspection during the batching of portland cement concrete mixture in the following manner:

1. Perform a fine aggregate moisture test to set the moisture meter and adjust batching weights before the production starts.

2. Check with the Plant Operator to see if the proper mix design is programmed.

3. Observe the automatic batching controls and recorder soon after production starts to see if they are working properly.

4. Spot check the recordation to see if the weight tolerance interlocks are working.

During production the Plant Inspector may encounter interruptions in the batching cycle, equipment breakdowns and malfunctions and situtations where the Plant Operator bypasses a cycle interruption by manipulating controls on the panel. The Plant Inspector can handle some of these situtations by the procedures described in the next subsections.

2-3.051 Batching Cycle Interruptions

When the automatic control interrupts the cycle because the batched quantity is outside the tolerance interlock settings, the Plant Inspector shall take the following action:

1. If the interlock settings are set less than the allowable batching tolerance range for the batch in question, the Inspector shall accept the batch and note the acceptance on the recordation of the batch.

2. If the interlock settings are set at the allowable batching tolerance for the batch in question, the Inspector may do one of the following and note it on the recordation:

Aggregate Overweight

Reject the batch unless the load requires two batches of which the second batch weights can be adjusted to compensate for the weighing error on the first batch.

Cement Overweight

Reject batch or hold back extra cement upon discharge.

Aggregate or Cement Underweight

Add additional material by either automatic or manual cycle control.

If the automatic cycle is frequently interrupted when the weight tolerance interlocks are set for the minimum batch weights, the Plant Inspector should notify the Regional Materials Engineer. The Materials Engineer can increase the minimum batch weights and consequently the minimum tolerance range to the point where the plant will batch consistently without interruptions. See Section 2-3.06, Minimum Batch Size for the Computations.

2-3.052 Equipment Malfunctions and Breakdowns

When a breakdown in the automation and/or recordation occurs, the Plant Inspector shall notify the Regional Materials Engineer. If the concrete production is interrupted or the quality of the concrete is affected by the breakdown, the Plant Inspector shall also notify the Project Engineer. The Materials Engineer may allow the Producer to batch and mix concrete mixtures for a period not exceeding 48 hours from the time of breakdown providing that acceptable concrete can be produced and recorded automatically or manually. The 48 hours are two consecutive calendar days excluding Sundays and New York State legal holidays. Written permission of

the Regional Director will be required for the Producer to operate without these instruments for periods longer than 48 hours.

When only portions of the batching or recordation equipment will not operate properly, it is the Inspector's responsibility to determine the seriousness of the trouble. It may be possible for the Producer to correct the problem without having to enter the 48 hour breakdown period. Some of the problems that may occur and action that an Inspector can take immediately are as follows:

	Problem	Suggested Action
1.	Draw weights incorrect	Check formula settings
2.	Draw weights incorrect, formula setting correct	Use alternate forumula setting (e.g. presets instead of card), Check scales for binding
3.	Draw weights out of tolerance, batching not automatically stopped by interlocks	Stop production, check tolerance and interlock settings
4.	Draw weights in tolerance, batching stopped frequently by interlocks	Check interlock settings
5.	Scale pointer not returning within zero tolerance and batching continues	Stop production, check zero tolerance and interlock setting, check for material caught in weigh hopper
6.	Scale pointer returns to zero batching stopped by zero interlock	Check zero tolerance and interlock setting
7.	Scale pointer vibration caused interlocks to stop batching frequency	Allow an increase in scale dampening to an extent which does not adversely affect the scale sensitivity.
8.	Mechanical or electrical equipment malfunction or failure	Stop production, notify producer and attempt to determine the cause of malfunction or failure. Notify Materials Engineer.

2-3.053 Seal Control

An automated concrete batching plant with interlock controls in proper operation will cause an interruption in the cycle whenever an error in batching occurs. Since a stoppage can be by-passed on most plants by manipulation of different controls or switches found on the panel, it is the responsibility of the Regional Materials Engineer and the Plant Inspector to insure that the interlock system will not be by-passed without the knowledge of the Inspector. The Materials Engineer may require seals to satisfy himself that the interlocks are not being by-passed.

When seals are used, they shall be broken only in the presence of the Plant Inspector. However, in his absence, the Producer may take action which requires breaking a seal, provided that the Inspector is notified as soon as practical. Should a Department seal placed on the proportioning equipment be broken without the knowledge and/or consent of the Inspector, production is unacceptable until he verifies the quantities by reviewing the recordation of all prior batches.

When digital recordation systems are used, the scale levers, rods, pulls and other accessories shall be covered so that the scales cannot be manipulated. Also the keyboard of the calculator shall be covered.

2-3.06 Minimum Batch Size

The minimum batch size for any plant is based upon the smallest weights that can be batched for aggregate and cement. The factors which govern the smallest or minimum batch weights are as follows:

1. Accuracy of the batching control equipment

2. Resolution of the graphic (strip-chart) recorder, when used.

In determining the minimum batch weight, both factors shall be considered. The factor that gives the largest minimum batch weights shall be used to determine the minimum batch size. For normal operations, the control equipment shall be considered accurate to no less than two (2) scale

graduations. This is to prevent frequent interruptions in the cycle during operation.

The method for determining minimum batch weights and subsequently minimum batch size are described by the following example:

Example: A batching plant has a cumulative aggregate weigh hopper and a digital recorder. The aggregate scale has a 30,000 pound capacity with 30 pound graduations. The cement scale has a 6000 pound capacity with 6 pound graduations. Determine the minimum batching weights for aggregate and cement and the resulting minimum batch size for a concrete mix having 3000 lbs./cy of aggregate and 600 lbs./cy of cement.

The minimum batch weights shall be determined by the following formula:

$$\text{Minimum batch weight} = \frac{\text{Minimum Batching Tolerance}}{\text{Material Batching Tolerance}}$$

For Aggregate:

The minimum batching tolerance is
(2 scale graduations) (30 pounds per graduation) = 60 lbs.

The aggregate batching tolerance, from specifications, is 2%

Therefore: Minimum Batch Weights $= \frac{60}{.02} = \underline{3000}$ pounds

For Cement:

The minimum batching tolerance is
(2 scale graduation) (6 pounds per graduation) = 12 lbs.

The cement batching tolerance, from specifications, is 1%

Therefore: Minimum Batch Weight $= \frac{12}{.01} = \underline{1200}$ pounds

In order to determine the minimum batch size for this example, the material weights are as follows:

1. Cement weight is 600 pounds per cubic yard

2. Aggregate weight is 3000 pounds per cubic yard

$$\text{Minimum Batch Size} = \frac{\text{Minimum Batch Weight}}{\text{Material Weight per Cubic Yard}}$$

For Aggregate:

$$\text{Minimum Batch Size} = \frac{3000 \text{ lbs.}}{3000 \text{ lbs./cy}} = 1 \text{ c.y.}$$

For Cement:

$$\text{Minimum Batch Size} = \frac{1200 \text{ lbs.}}{600 \text{ lbs./cy}} = 2 \text{ c.y.}$$

Based upon these computations, the minimum batch size for the plant is governed by the cement and is 2 cubic yards.

When a graphical (strip-chart) recorder is used, the same computations shall be made to determine if the resolution of the chart paper will govern the minimum batch size. The chart shall have "divisions that represent a quantity not greater than the allowable batching tolerance of the material being batched." Therefore, to determine the minimum batch weights, substitute the quantity represented by a division on the chart paper for the minimum batching tolerance. All succeeding computations to determine batch weights and then minimum batch size will be the same.

The minimum batch weights are determined by the Materials Bureau personnel at the time of the automation equipment inspection. These minimum batch weights are given in the approval letter sent to the Region Office. If the Regional Materials Engineer finds that the cycle is frequently interrupted during the operation with the minimum batch weights based upon the 2 graduation accuracy or resolution of the chart paper, he shall increase the graduations and compute new minimum batch weights.

2-3.07 Manual (Non-Automated) Proportioning

Some plants are approved with a manual weighing and cycling system to proportion cement, aggregates, admixtures and water. These materials are manually drawn according to a particular batching formula and shall be delivered within the batching tolerances given in Section 501 of the General Specifications. Batches produced outside these tolerances shall be either corrected or discarded. The Inspector shall spot-check the batching operations.

The cement batching controls shall be interlocked as follows:

1. The batcher inlet gates cannot be opened while the weigh hopper discharge gates are open.

2. The batcher discharge gates cannot be opened:
   - until the full batch weights are registered on the scales
   - while the weigh hopper is being filled.
   - if the batch weights are over or under the specified batching tolerance.

3. A new batch cannot be weighed until the hopper is entirely empty of the previous batch and all scales have returned to zero.

The Plant Inspector shall periodically check the above noted interlocks to determine if they are working properly. The same inspection procedure described in Section 2-3.036, Batching Interlocks can be used.

In addition to the interlocks on the cement batching controls, the manual plant shall be equipped with a moisture meter as described in Section 2-3.02, Moisture Meter. The operation of the moisture meter shall also be the same.

2-4 MIXERS AND HAUL UNITS

Portland cement concrete is delivered to the project and point of deposition in approved mixing or haul units. The following describes the concrete mixing and delivery systems normally used on Department Projects:

1. Transit Mixed Concrete

   This is defined as concrete mixed at the plant or enroute (in transit) to the project in a truck mixer. The cement, aggregates, admixtures, and water are batched at the concrete plant and mixing commences shortly after batching. Some additional mixing water may be required at the placement site in order to achieve the proper consistency (slump).

2. Truck Mixed Concrete

   This is defined as concrete mixed on the project in a truck mixer. The cement, aggregates and admixtures are batched at a plant and hauled to the project in a truck mixer. Mixing water is from a tank on the truck and all mixing is accomplished at the placement site. Allowable haul time varies depending upon the method of batching used at the plant.

3. Central Mixed Concrete

   This is defined as concrete mixed completely in a stationary mixer at the concrete plant. The mixed concrete is hauled to the project in either truck mixers or open haul units. When truck mixers are used, the drum revolves at agitating speeds while enroute to the placement site. Certain types of open haul units have agitating blades which also revolve while the unit is enroute to the placement site. Haul times varies with the type of haul equipment used.

4. Paver Mixed Concrete, Dry Batch

   This is defined as concrete mixed in a paving mixer located on the project. The cement, aggregates and

admixtures are batched at the concrete plant and hauled to the placement site in compartmented trucks. The individual batches are loaded into the paver where water is added and mixing occurs.

A summary of the standard specifications on concrete batching, mixing, hauling and discharging are given in Table 1. Any modifications to these specifications will be located in the project contract proposal.

2-4.01 Concrete Mixing and Hauling Units Inspection

The Plant Inspector shall inspect the operating condition of the mixing and hauling equipment to be assured that it is in good working order. This shall include periodically checking the blades inside the mixing drum for loose, broken, bent or worn blades. The Plant Inspector shall order the Producer to repair any deficiencies before the equipment can be used for Department work. Also the Plant Inspector shall notify the Regional Materials Engineer of these deficiencies.

The Plant Inspector shall obtain the mixer charging or loading sequence from the Regional Materials Engineer. During production, he shall periodically check the batching operation to be sure that the proper charging sequence is followed.

2-4.011 Transit Mixed Concrete

The Plant Inspector shall inspect the transit truck mixer to see if it has a current inspection seal (BR 275 - Approved Concrete Mixing/Delivery Unit). The inspection seal gives the allowable mixer capacity and the mixing speeds. The transit truck mixer shall also have an electric counting device which shows drum revolutions within the specified mixing range and total drum revolutions.

The electric revolution counting device shall be reset to zero by the Producer at the time of loading. The Plant Inspector shall periodically inspect the working condition of the revolution counter.

TABLE 1

SUMMARY OF CONCRETE BATCHING, MIXING, HAULING AND DISCHARGING

CENTRAL MIXED CONCRETE

BEGIN BATCHING

Charge mixer in an approved manner

END OF BATCHING & BEGIN MIXING

90 Seconds Minimum	After all materials are in the mixer

END OF MIXING

OPEN HAUL UNITS	ROTATING DRUM
	Agitators 2-6 rpm
30 Minutes Maximum	60 Mins. Maximum (Pavt) / 90 Mins. Maximum (Struct)

COMPLETION OF DISCHARGE

NOTE: When concrete is transported in units approved for mixing, the addition of not more than 10% of design water to obtain initial slump at the work site will be permitted

TRANSIT MIXED CONCRETE

Requires electric revolution counting device

BEGIN BATCHING

Materials hatch loaded or ribbon loaded thru back

Add at least 90% of design water

60 Minutes Maximum—Pavement
90 Minutes Maximum—Structural

CEMENT IN CONTACT W/AGGS

5 Minutes Maximum

BEGINNING OF MIXING

At plant or in transit

100 revs Minimum	160 revs Maximum

Mix: 6-12 rpm

END OF MIXING

Agitate 2-6 rpm

BEGINNING OF DISCHARGE

50 Minutes Maximum

COMPLETION OF DISCHARGE

NOTE: The addition of not more than 10% of design water to obtain initial slump at the work site will be permitted.

TRUCK MIXED CONCRETE

REGULAR TRUCK MIX

BEGIN BATCHING

Drum can be rocked or revolved for aggregates

Drum cannot be moved while cement is added

CEMENT IN CONTACT W/AGGS

30 Minutes Maximum

BEGINNING OF MIXING

At project, after the addition of water

100 revs Minimum	15 Minutes Maximum

Mix Speed: 6-12 rpm

END OF MIXING

30 Minutes Maximum	Agitate 2-6 rpm

COMPLETION OF DISCHARGE

LAYERED TRUCK MIX

BEGIN BATCHING

Fine agg. and SSD coarse agg. is loaded thru hatch. Can rock after each fraction

Drum cannot be moved while cement is added

CEMENT IN CONTACT W/AGGS

90 Minutes Maximum

BEGINNING OF MIXING

At project, after the addition of water

100 revs Minimum	15 Minutes Maximum

Mix Speed: 6-12 rpm

END OF MIXING

30 Minutes Maximum	Agitate 2-6 rpm

COMPLETION OF DISCHARGE

PAVER MIXED CONCRETE

BEGIN BATCHING

No specific loading criteria

CEMENT IN CONTACT W/AGGS

90 Minutes Maximum

BEGINNING OF MIXING

(Single)	(Double)
90 Seconds Minimum	75 Seconds Minimum

Mix Speed: 14-20 rpm

END OF MIXING

2-4.012 Truck Mixed Concrete

The Plant Inspector shall inspect the truck mixer to see if it has a current inspection seal (BR 275 - Approved Concrete Mixing/Delivery Unit). The inspection seal gives the allowable mixer capacity and mixing speeds. The truck mixer shall have a revolution counter that will give total revolutions as a minimum. The Plant Inspector shall periodically inspect the working condition of the revolution counter.

2-4.013 Central Mixed Concrete

The central mixer is approved as part of the batching equipment. The standard mixing time given in Table 1 of this manual shall apply except for the case where a reduced mixing time has been granted by the Department. The reduced mixing time is based on the results of a "mixer efficiency test" performed according to the procedures given in Materials Method 9.2, Appendix H., Uniformity Test Procedure. The Plant Inspector shall periodically inspect the length of mix time.

The central mixed concrete shall be delivered to the placement site in either open haul units (with or without rotating paddles) or rotating drum units. Open haul units shall be considered acceptable by the Plant Inspector when the truck bodies are smooth and free of any concrete build-up. No inspection seals are required. The rotating drum units shall meet the requirements of either transit or truck mixed concrete.

When concrete is delivered in either transit or truck mixers, mixing water may be added at the placement site. For this situation, the Plant Inspector shall insure that at least 90% of the design mixing water is used at the central mixer.

2-4.014 Paver Mixed Concrete

When concrete is mixed in a paver mixer, the materials shall be delivered to the mixer in batch boxes or trucks with compartments of sufficient tightness and capacity to carry individual batches without spillage of cement or aggregates during transit. The truck bodies shall be equipped with waterproof covers for production against wind and rain.

INSPECTOR'S CHECKLIST

Materials

1. Do you have an aggregate certification from the Producer showing all the required information?

2. Are the aggregate stockpiles identifiable and separated by sizes?

3. Have you performed tests on the aggregates
   - before production starts?

   - before starting after a shutdown?

4. Do the aggregates in the stockpile compare favorably to the reference sample by visual identification?

5. Do you understand the gradation control procedure diagrammed in Figures 1 and 2?

6. Have you checked the Approved Products Listing to see if the cement and admixtures are approved?

7. Do you know where the water is coming from?

Batching

8. Have you checked with the Materials Engineer to find out if the plant equipment has limitations?

9. Have the scales and meters been tested for accuracy recently?

10. Does the moisture meter work?

11. Are the design weights properly programmed into the control panel?

12. Does the moisture compensation device, if any, work properly?

13. Do you know what the batching tolerances are?

14. Are the weighing tolerance interlocks set and working properly?

INSPECTOR'S CHECKLIST (cont.)

15. Do you know what to do when a material weight is outside the interlock settings and the cycle is interrupted?

16. Do you know what your minimum batch weights are?

17. Do you know that the weighing tolerance interlocks set on the control panel may be set for less than the allowable tolerance for some batch sizes?

18. Do you know the codes on the recordation?

19. Do you know what information is required on the recordation?

20. Do you know what a breakdown is and when the 48 hour breakdown period begins and ends.

Mixing

21. Have you checked the condition of the blades in the mixing drums?

22. Do you know the mixer charging or loading sequence?

23. Do transit or truck mixers have current inspection seals?

24. Do the revolution counters work properly on transit or truck mixers?

25. Do you know what the mixing time is for the central mixer and have you checked it?

26. Do you approve of the condition of the open haul units?

27. Have you checked to see that prior to loading of the constituents of the concrete mixture that the truck mixers or open haul units have been drained of wash water?

SECTION 3

ADMINISTRATIVE PROCEDURES AND RECORD KEEPING

3-1 GENERAL

The Plant Inspector shall also be responsible for maintaining a diary, test records, production records and issuing acceptances of concrete production to projects. These records along with the material certifications and mix designs shall be kept on file at the plant in an orderly manner so they can be readily consulted. The diary shall be used to record miscellaneous test data and information and also to record conversations between the Plant Inspector and Producer.

For administrative purposes, concrete plants shall be in one of the two categories that follow:

1. Project Plant - A plant located on the project site for the purpose of serving the one project.

2. Non-Project Plant - A plant located off the project site. These are usually commercial plants capable of serving more than one project at a time.

3-2 DELIVERY TICKETS

Each vehicle delivering portland cement concrete or its ingredients to a project shall be accompanied by a delivery ticket prepared by the Producer. Delivery tickets will not be required when, in the opinion of the Project Engineer, adequate control can be maintained over project plants serving pavement or pavement foundation concrete.

The following minimum information shall be included on delivery tickets:

1. Delivery ticket number

2. Plant identification

3. Contract number

4. Concrete class or item number

5. Quantity (Nominal batch size)

6. Truck number

7. Batch number

8. An automatically applied time - date stamp which may consist of one of the following:

    a. Time - date stamp by printing device on a regular ticket (when no recorded batch weights accompany the load).

    b. Time - date printed by a batch weight recorder on a printed ticket.

    c. Time - date printed by a batch weight recorder on a printed tape. A copy of the tape shall be affixed to the regular delivery ticket.

The Plant Inspector shall review delivery tickets at least three (3) times daily for each project served to ascertain that they contain the proper information. The Inspector shall write the remark "Delivery Ticket OK" followed by his signature on each ticket reviewed.

3-3 PRODUCTION RECORDS

The acceptability of portland cement concrete dispatched from the plant is based on evidence that the materials used in the mix were approved and that they were properly proportioned. The quantity of acceptable concrete is determined from records containing this information.

3-3.01 Materials Acceptance Records

The records that the Plant Inspector shall keep on file at the plant during production relating to material acceptance are as follows:

1. Aggregate certifications

2. Cement shipment certifications or authorizations

3. Aggregate test results

4. Diary (admixtures and water source)

The aggregate certifications and cement shipment certifications along with the mix designs shall be ultimately incorporated into project files in the case of project plants. For non-project plants, all acceptance documents shall be maintained in the plant records.

3-3.011 Batch Recordation

Recordation may be filed with plant records or may be filed with delivery tickets in project files, depending upon the system in use. One of the following procedures shall be followed:

	Type Recordation	Disposition
1.	Printed delivery ticket	Collected by the Project Inspector. Filed at project.
2.	Printed tape	Collected daily by Plant Inspector. Filed at plant.
3.	Printed tape affixed to delivery ticket	Collected by Project Inspector. Filed at project.
4.	Graphical	Collected daily by Plant Inspector. Filed at plant.

The adoption of one of the above procedures or another, if unusual conditions exist, shall be based on an agreement between the Regional Materials Engineer, Project Engineer and the Producer.

3-4 CONCRETE ACCEPTANCE REPORT

A concrete acceptance report (BR-316, Daily Concrete Batch Plant Report) for concrete produced and authorized to be

shipped to each project shall be completed by the Plant Inspector at the end of the day. Inspectors at project plants shall give the report to the Project Engineer at the end of the day. Inspectors at non-project plants shall issue a copy of the report to each project served by the plant and retain the original for the plant records. The report shall be forwarded to the projects not later than the morning following the report date.

The reports shall be numbered consecutively by the Plant Inspector with Report 1 beginning on the first production day of any calendar year. The job stamp shall be applied at the project. A sample copy of the report is shown in Figure 8.

3-4.01 Quantity Determination

The Plant Inspector shall determine the acceptable quantity of concrete for each project by reviewing the production records. Acceptable concrete batches are batches that are made with acceptable materials and properly proportioned. A properly proportioned batch is one in which the material quantities are within allowable batching tolerances.

At the end of each working day, the Plant Inspector shall review the batch recordation and identify the class and count the number of acceptable batches dispatched to each project. In some cases the Plant Inspector may have permitted a batch weight to be corrected during production. These batches are acceptable providing that the recordation is so noted by the Inspector at the time the correction is made. The acceptable quantity shall be the number of batches multiplied by the appropriate batch sizes.

When a plant is finishing a placement in the Phase III condition due to aggregate gradation being out of specifications, the Plant Inspector shall note the quantities under "Remarks" in the report for each project affected. These quantities shall be included in the total amount of "Authorized Shipments".

The concrete shall be identified on the report by class when a standard class concrete is used. If the concrete is not a standard class, the concrete shall be identified by pay item number.

BR 316 (8/74) DAILY CONCRETE BATCH PLANT REPORT SHEET 1 OF 1

REPORT NO.	DATE	REGION	PLANT CODE NO.
1	6-14-75	1	7001

PLANT: ABC Concrete Co.

LOCATION: Albany, New York

MIXER TYPE: ☒ TRANSIT ☐ TRUCK ☐ CENTRAL ☐ DRY

JOB STAMP

AUTHORIZED SHIPMENTS

PROJECT		PROJECT		PROJECT		PROJECT	
FAC 74-8		Fish 74-3					
CLASS	QUANTITY	CLASS	QUANTITY	CLASS	QUANTITY	CLASS	QUANTITY
A	120 c.y.	A	192 c.y.				

MATERIALS

CEMENT	TYPE 2	BRAND Universal Atlas		LOCATION Hudson N.Y.
AGGREGATE	FINE	TEST NO. 74AF391	SOURCE	XYZ Sand & Gravel - Troy, N.Y.
	COARSE	TEST NO. 74AR103	SOURCE	XYZ Sand & Gravel - Troy, N.Y.
	COARSE	TEST NO.	SOURCE	
ADMIXTURE	AIR AGENT	BRAND MBVR		
	RETARDER	BRAND Pozzolith - 100R		
	WATER REDUCER	BRAND		
WATER	☒ MUNICIPAL SUPPLY ☐ WELL ☐ POND ☐ STREAM ☐ OTHER			

REMARKS: FAC 74-8, Class A
Placement stopped when Phase III condition occurred.

Fish 74-3, Class A
1. Quantity includes 32 c.y. batched under Phase III condition as requested by J. Jones, E.I.C. Batch Nos. are 36 thru 39.
2. Retarder used

PLANT INSPECTOR (signature)	PROJECT REVIEWER (signature)
Joseph Bushey	J. Jones E.I.C.

FIGURE 8

3-5 ACCEPTANCE OF SMALL QUANTITIES BY PRODUCER'S CERTIFICATION

When it is not feasible to provide plant inspection for small quantities, the Regional Materials Engineer and Project Engineer may agree to accept the concrete from an approved plant on the basis of a Producer's certification stating that the concrete conforms to specification. The certification shall be form BR-274 Producer's Certification, Miscellaneous Concrete Deliveries completed by the Producer as shown in Figure 9. Also recordation for each batch shall accompany the certification.

Small quantities of concrete may be certified for the following placements:

1. Sign foundations
2. Lighting structure foundation
3. Curbs
4. Gutters
5. Headwalls
6. Catchbasins
7. Manholes
8. Drop Inlets
9. Field Inlets
10. Concrete Riprap
11. Concrete Driveways
12. Other similar placements

BR 274 (7/70)

PRODUCER'S CERTIFICATION
MISCELLANEOUS CONCRETE DELIVERIES

PROJECT	ITEM/CLASS	DELIVERY TICKET NO.	SHIPMENT DATE
FTP 74-26	A	014625	6-16-75

I CERTIFY THAT THE CEMENT CONCRETE DELIVERED WITH THE DELIVERY TICKET TO THE ABOVE PROJECT WAS BATCHED IN ACCORDANCE WITH CONTRACT SPECIFICATIONS FOR THE SPECIFIC ITEM AND CLASS NOTED USING THE FOLLOWING N.Y.S. DEPARTMENT OF TRANSPORTATION ACCEPTED MATERIALS.

CEMENT		BRAND: Universal Atlas	TYPE: 2
		LOCATION: Hudson, N.Y.	
AGGREGATE	COARSE	SOURCE: XYZ Sand & Gravel - Troy	TEST #: 74AR103
	FINE	SOURCE: XYZ Sand & Gravel - Troy	TEST #: 74AF391
ADMIX	AEA	BRAND: MBVR	AMOUNT: 27 oz.
	RET	BRAND:	AMOUNT:

ATTACHED ARE TRUCK DELIVERY TICKET AND RECORDED BATCH INFORMATION INCLUDING TIME AND DATE.

I UNDERSTAND THAT THIS CERTIFICATION IS VALID ONLY FOR USE AS EVIDENCE OF ACCEPTABILITY FOR MISCELLANEOUS DELIVERIES SUCH AS POST HOLES, DROP INLETS, ETC., BUT NOT FOR STRUCTURAL OR PAVEMENT CONCRETE.

ABC Concrete Co.
SUPPLIER

Joseph Jones
SIGNATURE - PLANT SUPERINTENDENT

6-16-75
DATE

FIGURE 9

INSPECTOR'S CHECKLIST

1. Are your daily records neat, legible and properly filed?

2. Are you spot checking the delivery tickets to determine if they contain the proper information?

3. Do you know what an acceptable batch of concrete is?

4. Have you reviewed the batch recordations and identified the batches according to class and project destination?

5. Does the quantity listed under authorized shipment on form BR-316 represent only acceptable batches?

6. Have you noted under "Remarks" on form BR-316 the quantity of any concrete produced under the Phase III condition?

SECTION 4

PLANT AND MIXER APPROVALS

4-1 GENERAL

The concrete batching plant, including the testing facility and truck mixers shall be inspected and approved by the Department before production begins and then annually thereafter while the plant remains in the same location. The approvals shall be granted to the Producer upon compliance with the specifications. The approval procedures are described in this section.

The Regional Director may at any time discontinue the use of any previously approved equipment if non-conformance with the specifications result during the progress of the work. When the Regional Director discontinues the approval, the equipment will not be acceptable for Department work until corrections are made by the Producer. The Regional Director may then reinstate the approval.

4-2 PLANT APPROVAL

The plant inspection shall be performed by the Regional Materials Engineer or his representative. The requirements for the plant and testing facility are given in Section 501 of the General Specifications.

The inspection results shall be recorded on Form BR-180, Annual Inspection Record - Portland Cement Concrete Batch Plant. An example of a completed inspection form is given in Appendix J. Two copies of the form shall be submitted to the Materials Bureau for review. Plants found acceptable in the review will be approved by the Deputy Chief Engineer (Technical Services). Upon approval, one copy of the report stating limitations, if any, will be returned to the Region Office.

4-2.01 Automatic Batching Controls

The automatic batching and recording equipment shall be inspected by personnel from the Materials Bureau after the equipment is

installed, but before the plant produces concrete for Department work. At the time of the inspection the Producer shall have a person capable of making adjustments to the automatic controls. This would normally be a manufacturer's representative of the company making the control equipment.

After the automatic batching and recording equipment is found acceptable, the automation system will be approved in writing by the Deputy Chief Engineer (Technical Services).

After the initial inspection, further inspections are made by the Materials Bureau when:

1. Major changes are made in the scales, batching controls or recorder.

2. Requested by the Regional Materials Engineer.

4-3 TRUCK MIXERS

An annual inspection of all truck mixers used for Department work during the construction season shall be made by the Regional Materials Engineer. The mixer shall meet the requirements given in Section 501 of the General Specifications.

If the requirements are met, the Materials Engineer shall affix an inspection seal (BR-275 Approved Concrete Mixing/Delivery Unit) in a visible place within the truck cab. A sample copy of the inspection seal is given in Figure 10.

Any time that an approval is discontinued, the inspection seal shall be removed and replaced only after repairs are made by the Producer.

ANNUAL INSPECTION SEAL

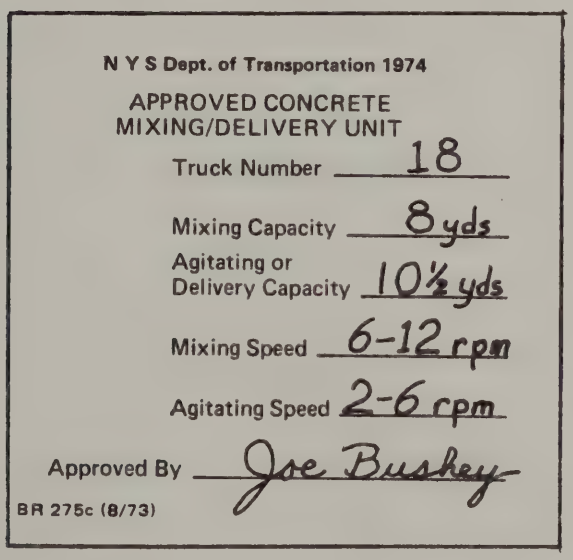


FIGURE 10

APPENDICIES

APPENDIX A

SAMPLING OF AGGREGATES

A. SCOPE

This method prescribes procedures for obtaining and preparing a sample of aggregate that represents the material being used in the concrete.

B. GENERAL

The Regional Materials Engineer shall choose one of the sampling points given below for each plant. In choosing the sampling point, safety of the Plant Inspector shall be taken into consideration. The Inspector shall take samples from the selected point according to these procedures.

C. EQUIPMENT

The following equipment is generally used for sampling:

1. Pails
2. Square Shovel
3. Brush
4. Sample Splitter with Pans

D. SAMPLING PROCEDURES

1. Stockpile Sampling

a. Conical Stockpiles

The sample shall be composed of material representing at least nine (9) points in the stockpile. Samples shall be taken at third (1/3) points around the pile and at three (3) levels (base, middle, and top). At each point, the

face shall be exposed to a minimum depth of one (1) foot before sampling. Care shall be taken so that aggregate adjacent to the sampling point does not fall into the sampling area.

b. Other Stockpiles

The details for conical stockpiles shall apply except that the sample shall be composed of material representing at least six (6) points in the area of the stockpile being used for production. Samples shall be taken from two (2) locations in reference to the base and at three (3) levels, (base, middle, and top).

2. Belt Sampling

A portion of aggregate large enough to comprise the required sample size shall be removed from the stopped belt with a square shovel and placed in a sample container. Care shall be taken to remove all the material on the belt in the sampling area. A brush may be used to remove the fine material clinging to the belt.

3. Bin Sampling

Samples shall be obtained with a sampling device that allows the Inspector to obtain representative samples from the full width and depth of the discharge area from each bin while the plant is in operation. The device shall consist of a sampling tray of adequate capacity which is structurally supported during the sampling operation. A shovel is not satisfactory for this purpose.

E. SAMPLE SIZE

The amount of aggregate required for a representative sample and the size of sample for testing are given in the respective test methods.

When a non-standard aggregate size is used, the sample size shall be that of the closest standard primary size.

F. SAMPLE PREPARATION

In order to obtain a convenient sample size for sieving, or for other tests, a large bin, stockpile, or belt sample may be reduced by a sample splitter or by quartering.

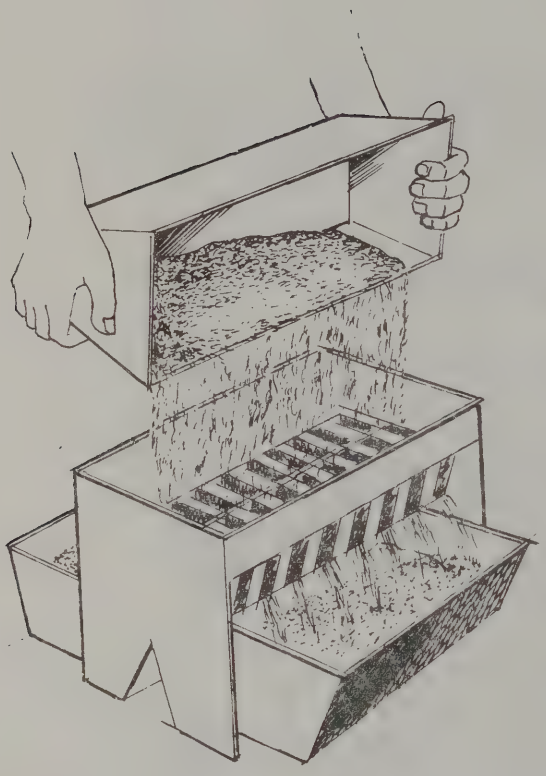
When using a sample splitter, the original sample shall be split into two (2) fractions. If one of these fractions is too large for testing, a fraction can be split again. This splitting procedure can be used until the proper size sample for testing is achieved.

If a sample splitter is not available, the sample shall be reduced by quartering using the following method:

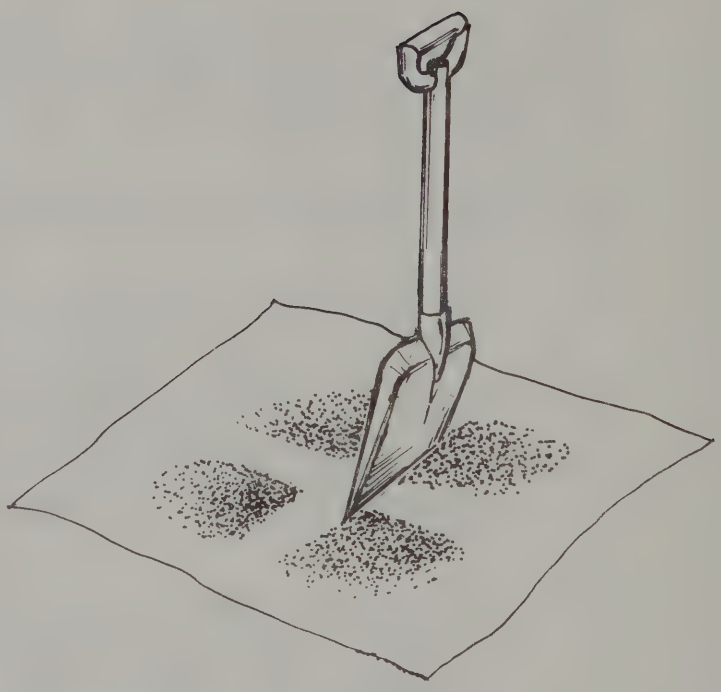
a. Distribute a scoopful of the aggregates as uniformly as possible over a wide, flat area on a tight weave canvas, or other smooth surface. Continue to distribute scoopfuls of aggregates in layers until all of the aggregate is used to make a wide, flat pile that is reasonably uniform in thickness and distribution of aggregate sizes. Do not permit coning of the aggregates.

b. Divide the sample into equal quarters with a square end shovel, trowel or straight piece of sheet metal. Discard two (2) opposite quarters and combine the remaining quarters taking care to include the dust and fines with each quarter. If necessary, this procedure is repeated until the sample size has been reduced sufficiently.

Figure A-1 illustrates both techniques for reducing the sample size.



Splitting a sample with a sample splitter



Quartering a sample with a square end shovel on a piece of canvas

FIGURE A-1

APPENDIX B

COARSE AGGREGATE GRADATION TEST

A. SCOPE

This test method prescribes the procedures for determining the gradation of coarse aggregates for individual aggregate sizes and combined gradation when more than one aggregate size is used in the concrete.

B. SAMPLE

The samples shall be obtained and reduced to testing size in accordance with Appendix A, Sampling of Aggregates. The amount of aggregate required for a representative sample and the size of sample for testing are as follows:

Aggregate Size	Original Sample Lbs., Min.	Test Sample Lbs., Min.
#3	160	40
#2	80	20
#1 & #2 blend	80	20
#1	40	20
#1A	20	10

C. EQUIPMENT

The following equipment is required for the coarse aggregate gradation test:

1. Power driven coarse aggregate sieve shaker with appropriate sieves and timer
2. Large capacity scale

3. Oven or hot plate

4. Pans

5. Brush

6. Stirring spoon

D. TEST PROCEDURE

1. Dry the sample to a constant weight.

   NOTE: The Materials Engineer may permit the Plant Inspector to test the No. 3 and/or No. 2 size aggregate for gradation without drying the aggregate to a constant weight providing that the aggregate is relatively free of moisture. Indicate on the gradation form if the sample was not dried, i.e., "not dried".

2. Weigh the sample.

3. Sieve the sample using the sieve sizes for the particular aggregate for at least five (5) minutes. Do not combine different samples. Also do not overload the sieves. As a guide, any sieve loaded with more than a single layer of aggregate at the end of the test is overloaded. When overloading occurs, sieve only portions of the sample at a time, and combine like sizes after sieving.

4. Weigh the material retained on each sieve and pan to the nearest 0.01 pounds and record the retained weights. The total of the retained weights should agree closely with the original sample weight determined in Step 2.

E. CALCULATIONS

The calculations needed to determine the coarse aggregate gradation are described by examples given below. Example 1 shows the calculation for the gradation of an individual aggregate size; and Example 2 shows the calculations for determining the combined gradation when two aggregate sizes

are used in the concrete mixture.

Example 1

A sample of No. 1 size aggregate has been sieved and the weights of retained material are as follows:

Sieve	Weight Retained
1"	0 lbs.
½"	0.92 lbs.
¼"	18.18 lbs.
Pan	1.39 lbs.
TOTAL	20.49 lbs.

Step 1

The retained weights are expressed as percentages of the total weight:

½" sieve % Ret. = $\frac{0.92}{20.49}$ X 100 = 4.5%

¼" sieve % Ret. = $\frac{18.18}{20.49}$ X 100 = 88.7%

Pan % Ret. = $\frac{1.39}{20.49}$ X 100 = 6.8%

Step 2

The gradation of the aggregate in terms of percent passing each sieve are obtained by adding cumulatively, beginning with the smallest sieve.

% Pass. ¼" = 6.8

% Pass. ½" = 6.8 + 88.7 = 95.5%

% Pass. 1" = 95.5 + 4.5 = 100.0%*

*May sometimes be only within one or two tenths of 100.0% due to rounding and slide rule accuracy. This may be neglected.

Example 2

Class A concrete is being produced with coarse aggregate from separate stockpiles for the No. 1 and No. 2 sizes. The gradations for the separate stockpiles were performed in the same manner as described in Example 1 and are as follows:

	No. 1			No. 2		
Sieve	Wt. Ret.	% Ret.	% Pass.	Wt. Ret.	% Ret.	% Pass.
1½"				0.00	0.0	100.0
1"	0.00	0.0	100.0	1.75	7.0	93.0
½"	2.00	10.0	90.0	22.25	89.0	4.0
¼"	16.00	80.0	10.0			
Pan	2.00	10.0		1.00	4.0	
Total	20.00	100.0		25.00	100.0	

The batch weights for the coarse aggregate in a one cubic yard batch of concrete are as follows:

No. 1 1010 pounds

No. 2 1010 pounds

Determine the combined gradation for these two aggregates. Calcuclations for this example are also shown in Figure B-1.

Step 1

The batch weights of coarse aggregate are converted to percentages of the total coarse aggregate weight.

$$\% \text{ No. 1} \quad \frac{1010}{1010 + 1010} \times 100 = 50.0\%$$

$$\% \text{ No. 2} \quad \frac{1010}{1010 + 1010} \times 100 = 50.0\%$$

Step 2

The gradation for each coarse aggregate sieve (percent passing) is multiplied by the percentage of total coarse aggregate for the respective samples.

> % Passing the ½ inch sieve in the No. 1 stockpile is
> 50 x 0.90 = 45.0%

This calculation is repeated for each sieve size for both aggregates.

Step 3

The results obtained in Step 2 are added together for each sieve size to get the total percent passing for the combined gradation.

> Total % Passing ½ inch sieve
>
> | | |
> |---|---|
> | No. 1 | 45.0% |
> | No. 2 | 2.0% |
> | Total | 47.0% |

F. REPORT

The gradation test results shall be determined and reported on Form No. BR 317, Aggregate Tests - Portland Cement Concrete Plant. Round off the percent passing results to the nearest whole percent.

BR 317 (8/74)
REVERSE

COARSE AGGREGATE TESTS

INDIVIDUAL SAMPLE GRADATION

SIEVE SIZES	NO. 3				NO. 2				NO. 1				NO. 1 & NO. 2 (PREBLENDED)			
	WT.	PERCENT RET.	PERCENT PASS	SPEC. LIMITS	WT.	PERCENT RET.	PERCENT PASS	SPEC. LIMITS	WT.	PERCENT RET.	PERCENT PASS	SPEC. LIMITS	WT.	PERCENT RET.	PERCENT PASS	SPEC. LIMITS
2 1/2"				100												
2"				90-100												
1 1/2"				35-70	0.0	0.0	100.0	100								100
1"				0-15	1.75	7.0	93.0	90-100	0.0	0.0	100.0	100				93-100
1/2"					22.25	89.0	4.0	0-15	2.0	10.0	90.0	90-100				27-58
1/4"									16.0	80.0	10.0	0-15				0-8
PAN					1.00	4.0	—		2.0	10.0	—					
TOTAL					25.00	100.0			20.00	100.0						

COMBINED GRADATION

BIN	POUNDS BATCHED	PERCENT BATCHED	PERCENT PASSING 2 1/2	2	1 1/2	1	1/2	1/4
3								
2	1010	50.0			50.0	46.5	2.0	
1	1010	50.0			50.0	50.0	45.0	5.0
1 & 2								
TOTAL					100.0	96.5	47.0	5.0
GENERAL LIMITS					100	93/100	27/58	0/8

VISUAL IDENTIFICATION

Compares favorably to certified aggregate reference sample? ☒ YES ☐ NO

FIGURE B-1

G. ACTION

The gradation test results shall be compared to the specification limits. The Plant Inspector shall take the appropriate action described in Section 2-2.015, Aggregate Gradation Control.

APPENDIX C

COARSE AGGREGATE CLEANNESS TEST

A. SCOPE

This test method prescribes the procedure for determining the percentage of material finer than the No. 200 sieve in the coarse aggregates.

B. SAMPLE

The sample shall be obtained and reduced to testing size in accordance with Appendix A, Sampling of Aggregates. The amount of aggregate required for a representative sample and the size of testing are as follows:

Aggregate Size	Original Sample Lbs., Min.	Test Sample Lbs., Min.
#3	40	10
#2	24	6
#1	12	3
#1A	12	3

C. EQUIPMENT

The following equipment is required for the coarse aggregate cleanness test:

1. Oven or hot plate
2. Pans
3. Stirring Spoon
4. Brush

5. Large capacity scale

6. Sieves (No. 16 and No. 200)

D. TEST PROCEDURE

1. Dry the test sample to constant weight.

2. Weigh the dried sample.

3. Place the dried aggregate sample in a pan or vessel, cover with water.

4. Agitate vigorously to separate the fine particles from the coarse aggregate and bring the fine material into suspension.

5. Decant the wash water containing the suspended solids immediately through two nested sieves (No. 16 and No. 200) taking care that none of the coarser particles are decanted into the sieves.

6. Continue Steps 2, 3 and 4 until the wash water is clear.

7. Return all material retained on the nested sieves (by flushing with water) to the washed sample in the pan.

8. Dry washed sample to a constant weight.

E. CALCULATION

The percentage of minus 200 material is computed by the following equation:

$$\% \text{ minus } 200 \text{ Material} = \frac{Wosd - Wwsd}{Wosd} \times 100$$

Wosd = Weight of original sample after drying

Wwsd = Weight of washed sample after drying

An example is shown in Figure C-1.

BR 317 (8/74)

NEW YORK STATE DEPARTMENT OF TRANSPORTATION
MATERIALS BUREAU

AGGREGATE TESTS
PORTLAND CEMENT CONCRETE PLANT

PLANT: ABC Concrete Co.	LOCATION: Albany N.Y.		REGION: 1
DATE: 6-2-75	TIME OF SAMPLE: 9:30 A.M.	CONCRETE CLASS: A	TEST: ☒ routine ☐ retest
INSPECTOR: Joe Bushey		CONTRACTS SERVED: FAC 74-8 FISH 74-3	

	FINE AGGREGATE	COARSE AGGREGATE
CHECK TEST(S) REPORTED ON THIS FORM	☐ gradation ☐ minus No. 200 ☐ fineness modulus ☐ moisture ☐ visual ident.	☐ gradation ☐ visual ident. ☒ cleanness ☐ moisture
CHECK SAMPLE LOCATION	☐ belt ☐ barge ☐ stockpile ☐ other ☐ bin	☐ belt ☐ barge ☒ stockpile ☐ other ☐ bin

FINE AGGREGATE TESTS

GRADATION					FINENESS MODULUS		VISUAL IDENTIFICATION
SIEVE	WT.	% RETAINED	% PASSING	SPEC. LIMITS	SIEVE	100-%PASS	Compares favorably to certified aggregate reference sample? ☐ YES ☐ NO
3/8"				100			
4				90-100	4		If "No", explain _____
8				75-100	8		
16				50-85	16		
30				25-60	30		
50				10-30	50		
100				1-10	100		
200				0-3			
PAN							
TOTAL					TOTAL		

$FM = \left(\frac{\text{total}}{100}\right) = \frac{\quad}{100} =$ FM (MIX DESIGN)

FINE AND COARSE AGGREGATE TESTS

MINUS NO. 200 MATERIAL		FREE MOISTURE CONTENT			
AGGREGATE SIZE DESIGNATION	#1	AGG. SIZE	FINE	NO. 1	NO. 2
WT. ORIGINAL SAMPLE (DRY) (A)	9.98 lb.	WT. (WET) (A)			
WT. AFTER WASHING (DRY) (B)	9.90 lb.	WT. (SSD) (B)			
WT. MINUS NO. 200 MATL. (A-B)	.08 lb	WT. (H_2O) (A-B)			
% MINUS NO. 200 $\left(\frac{A-B}{A} \times 100\right) = \frac{.08}{9.98} \times 100 = 0.80\%$		% FREE MOIST. $\left(\frac{A-B}{B} \times 100\right)$			

FIGURE C-1

F. REPORT

Report the percentage of material finer than the No. 200 sieve and the computations for each size coarse aggregate tested on Form BR 317, Aggregate Tests - Portland Cement Concrete Plant. Round off the test results to the nearest 0.1 percent.

G. ACTION

The percent of minus No. 200 material shall be compared to the specification limits. The Plant Inspector shall take the appropriate action indicated under Section 2-2.014 (b), Coarse Aggregate Cleanness.

APPENDIX D

FINE AGGREGATE GRADATION TEST

A. SCOPE

This test method prescribes the procedure for determining the gradation of the fine aggregate. The percentage of material finer than the No. 200 sieve is part of the complete fine aggregate gradation test.

B. SAMPLE

The sample shall be obtained and reduced to testing size in accordance with Appendix A, Sampling of Aggregates. The amount of aggregate required for a representative sample is a minimum of ten (10) pounds and the sample size required for testing is a minumum of 500 grams.

C. EQUIPMENT

The following equipment is required for the fine aggregate gradation test:

1. Power driven fine aggregate sieve shaker with appropriate sieves and timer.
2. Small capacity scale.
3. Oven or hot plate
4. Pans
5. Brush
6. Stirring spoon
7. Sieves (No. 16 and No. 200) for washing

D. TEST PROCEDURE

A complete fine aggregate test shall include a determination of the minus No. 200 material by a washed analysis. The Materials Engineer may delete the washing requirement for routine gradation tests when at least 3 consecutive minus No. 200 material tests for a fine aggregate has less than 1.0%. However, the minus No. 200 material shall be determined by the washed analysis at least once per week as part of the complete gradation test. When the washed analysis is not used, the gradation shall be determined for the sizes 3/8 inch through the No. 100 sieve inclusively.

The complete test procedure is outlined in the following steps:

1. Dry the sample until the weight is constant.

2. Carefully weigh dried sample and record this weight.

3. Place entire sample in a pan, add sufficient water to cover the sample. Agitate the sample with sufficient vigor to separate all particles finer than the No. 200 sieve from the coarser particles, and to bring the fine material into suspension.

4. Immediately pour the wash water containing the suspended and dissolved solids over a nest of the No. 16 (on top) and No. 200 sieve. Take care to avoid, as much as feasible, the decantation of coarser particles of the sample.

5. Add a second charge of water to the sample in the pan, agitate and decant as in (4) above. Repeat this pro-dure until the wash water is clear.

6. Return all material retained on the nested sieves (by flushing with water) to the washed sample in the pan.

7. Dry the washed sample until the weight is constant.

8. Carefully weigh the dried sample and record this weight as dry weight after washing.

9. Place the dried sample in a nest of 8" diameter sieves (3/8", Nos. 4, 8, 16, 30, 50, 100 and Pan) and shake

for at least ten (10) minutes. Care must be taken so as not to overload the sieves. As a guide, any fine aggregate sieve (8" in diameter) loaded with over 200 grams of materials at the end of the test may be considered as overloaded. When overloading occurs, it will be necessary to sieve only portions of the sample at a time, or to introduce a sieve having larger openings above the critical sieve and add the results to obtain the total sample gradation.

10. Carefully weigh the material retained on each sieve and the pan. Enter the weight retained in the pan as weight retained on the No. 200 sieve. This can be done because the minus 200 material has already been removed in Steps 3-8.

E. CALCULATIONS

The fine aggregate gradation is calculated by using results from the wet and dry sieving. The computations necessary to obtain "percent passing" are illustrated in the following example. Figure D-1 shows how the calculations are reported on Form BR 317, Aggregate Tests - Portland Cement Concrete Plant.

Example

A sample of fine aggregate has been tested and the following data obtained:

Dry Wt. - Original Sample 504.8 gms.

Dry Wt. - After Washing 502.3 gms.

Sieve	Wt. Retained, gms.
3/8"	0
4	40.9
8	62.1
16	93.9
30	115.0
50	85.8
100	81.3
Pan	23.3*

*Recorded as weight retained on the No. 200 sieve since this is the gradation of the washed sample.

The calculations to determine the fine aggregate gradation are described in the following steps:

Step 1

The actual amount of material retained in the pan, based on the original sample, is the same as the amount of minus No. 200 material and this amount is 504.8 - 502.3 = 2.5 grams. This result shall be shown as the weight retained in the pan.

Step 2

The amounts retained are now expressed as percentages of the original sample (dry weight before washing).

Sieve	% Retained
3/8"	$\frac{0}{504.8} \times 100 = 0$
4	$\frac{40.9}{504.8} \times 100 = 8.1$
8	$\frac{62.1}{504.8} \times 100 = 12.3$
16	$\frac{93.9}{504.8} \times 100 = 18.6$
30	$\frac{115.0}{504.8} \times 100 = 22.8$
50	$\frac{85.8}{504.8} \times 100 = 17.0$
100	$\frac{81.3}{504.8} \times 100 = 16.1$
200 (actually amount on pan from sieving washed sample)	$\frac{23.3}{504.8} \times 100 = 4.6$
Pan (actually amount lost from washing)	$\frac{2.5}{504.8} \times 100 = \frac{0.5}{100.0\%}$

Step 3

The percent passing is determined by cumulatively adding the results of percent retained from the smallest sieve size upwards to the largest.

Sieve		% Passing
200	0.5 =	0.5
100	0.5 + 4.6 =	5.1
50	5.1 + 16.1 =	21.2
30	21.2 + 17.0 =	38.2
16	38.2 + 22.8 =	61.0
8	61.0 + 18.6 =	79.6
4	79.6 + 12.3 =	91.9
3/8"	91.9 + 8.1 =	100.0*

*May sometimes be only within one or two tenths of 100.0% due to rounding and slide rule accuracy. This may be neglected.

F. REPORT

The gradation test results shall be determined and reported on Form BR 317, Aggregate Tests - Portland Cement Concrete Plant. Round off the percent passing results to the nearest whole percent.

G. ACTION

The gradation test results shall be compared to the specification limits. The Plant Inspector shall take the appropriate action described in Section 2-2.015, Aggregate Gradation Control.

BR 317 (8/74)

NEW YORK STATE DEPARTMENT OF TRANSPORTATION
MATERIALS BUREAU

AGGREGATE TESTS
PORTLAND CEMENT CONCRETE PLANT

PLANT: ABC Concrete Co.		LOCATION: Albany N.Y.	REGION: 1
DATE: 6-2-75	TIME OF SAMPLE: 10:00 A.M.	CONCRETE CLASS: A	TEST: ☒ routine ☐ retest
INSPECTOR: Joe Bushey		CONTRACTS SERVED: FAC 74-8 FISH 74-3	

	FINE AGGREGATE	COARSE AGGREGATE
CHECK TEST(S) REPORTED ON THIS FORM	☒ gradation ☒ minus No. 200 ☐ fineness modulus ☐ moisture ☐ visual ident.	☐ gradation ☐ visual ident. ☐ cleanness ☐ moisture
CHECK SAMPLE LOCATION	☐ belt ☐ barge ☒ stockpile ☐ other ☐ bin	☐ belt ☐ barge ☐ stockpile ☐ other ☐ bin

FINE AGGREGATE TESTS

GRADATION					FINENESS MODULUS		VISUAL IDENTIFICATION
SIEVE	WT.	% RETAINED	% PASSING	SPEC. LIMITS	SIEVE	100-%PASS	Compares favorably to certified aggregate reference sample? ☐ YES ☐ NO
3/8"	0.0	0.0	100	100			
4	40.9	8.1	91.9	90-100	4		If "No", explain
8	62.1	12.3	79.6	75-100	8		
16	93.9	18.6	61.0	50-85	16		
30	115.0	22.8	38.2	25-60	30		
50	85.8	17.0	21.2	10-30	50		
100	81.3	16.1	5.1	1-10	100		
200	23.3	4.6	0.5	0-3			
PAN	2.5	0.5					
TOTAL	504.8	100.0			TOTAL		

FM $\left(\frac{\text{total}}{100}\right) = \frac{\quad}{100} =$ FM (MIX DESIGN)

FINE AND COARSE AGGREGATE TESTS

MINUS NO. 200 MATERIAL		FREE MOISTURE CONTENT			
AGGREGATE SIZE DESIGNATION	SAND	AGG. SIZE	FINE	NO. 1	NO. 2
WT. ORIGINAL SAMPLE (DRY) (A)	504.8 gm.	WT. (WET) (A)			
WT. AFTER WASHING (DRY) (B)	502.3 gm.	WT. (SSD) (B)			
WT. MINUS NO. 200 MAT'L. (A-B)	2.5	WT (H_2O) (A-B)			
% MINUS NO. 200 $\left(\frac{A-B}{A} \times 100\right) = \frac{2.5}{504.8} \times 100 =$ 0.49%		% FREE MOIST. $\left(\frac{A-B}{B} \times 100\right)$			

FIGURE D-1

APPENDIX E

FINE AGGREGATE FINENESS MODULUS TEST

A. SCOPE

This test method prescribes the procedure for determining the fineness modulus of a fine aggregate.

B. GENERAL

The fineness modulus is computed from data obtained in the fine aggregate gradation test under Appendix D, Fine Aggregate Gradation Test. All the sieve sizes are used except the 3/8 inch and No. 200.

C. CALCULATION

The "% Passing" results representing the total percent passing each sieve are converted to total percent of material retained on each sieve. This is accomplished by subtracting the individual "% Passing" from 100. The fineness modulus is determined by summing these results and dividing by 100.

The fineness modulus is computed below for the fine aggregate gradation example given in Appendix D, Fine Aggregate Gradation. Also this fineness modulus is illustrated on the BR 317 form in Figure E-1.

Step 1

Sieve	Total % Pass.		Total % Ret.
4	91.9	100 - 91.9 =	8.1
8	79.6	100 - 79.6 =	20.4
16	61.0	100 - 61.0 =	39.0
30	38.2	100 - 38.2 =	61.8
50	21.2	100 - 21.2 =	78.8
100	5.1	100 - 5.1 =	94.9
		TOTAL	303.0

Step 2

The "Total % Ret." figures are then added. The fineness modulus is the sum divided by 100.

$$FM = \frac{303.0}{100} = 3.030$$

D. REPORT

The fine aggregate fineness modulus shall be determined and reported on Form BR 317, Aggregate Tests - Portland Cement Concrete Plant. Round off the fineness modulus results to the nearest 0.01.

E. ACTION

The fineness modulus shall be compared to the design value given on the mix design. The Plant Inspector shall take the appropriate action described in Section 2-2.014 (d), Fine Aggregate Fineness Modulus.

BR 317 (8/74)

NEW YORK STATE DEPARTMENT OF TRANSPORTATION
MATERIALS BUREAU

AGGREGATE TESTS
PORTLAND CEMENT CONCRETE PLANT

PLANT: ABC Concrete Co.	LOCATION: Albany N.Y.		REGION: 1
DATE: 6-2-75	TIME OF SAMPLE: 10:30 A.M.	CONCRETE CLASS: A	TEST: ☒ routine ☐ retest
INSPECTOR: Joe Buskey		CONTRACTS SERVED: FAC 74-8 FIH 74-3	

	FINE AGGREGATE	COARSE AGGREGATE
CHECK TEST(S) REPORTED ON THIS FORM	☒ gradation ☒ minus No. 200 ☒ fineness modulus ☐ moisture ☐ visual ident.	☐ gradation ☐ visual ident. ☐ cleanness ☐ moisture
CHECK SAMPLE LOCATION	☐ belt ☐ barge ☒ stockpile ☐ other ☐ bin	☐ belt ☐ barge ☐ stockpile ☐ other ☐ bin

FINE AGGREGATE TESTS

GRADATION					FINENESS MODULUS		VISUAL IDENTIFICATION
SIEVE	WT.	% RETAINED	% PASSING	SPEC. LIMITS	SIEVE	100-%PASS	Compares favorably to certified aggregate reference sample? ☐ YES ☐ NO
3/8"	0.0	0.0	100	100			
4	40.9	8.1	91.9	90-100	4	8.1	
8	62.1	12.3	79.6	75-100	8	20.4	If "No", explain
16	93.9	18.6	61.0	50-85	16	39.0	
30	115.0	22.8	38.2	25-60	30	61.8	
50	85.8	17.0	21.2	10-30	50	78.8	
100	81.3	16.1	5.1	1-10	100	94.9	
200	23.3	4.6	0.5	0-3			
PAN	2.5	0.5					
TOTAL	504.8	100.0			TOTAL	303.0	

$FM = \left(\frac{\text{total}}{100}\right) = \frac{303.0}{100} = 3.030$

FM (MIX DESIGN): 2.96

FINE AND COARSE AGGREGATE TESTS

MINUS NO. 200 MATERIAL		FREE MOISTURE CONTENT			
AGGREGATE SIZE DESIGNATION	SAND	AGG. SIZE	FINE	NO. 1	NO. 2
WT. ORIGINAL SAMPLE (DRY) (A)	504.8 gm	WT.(WET)(A)			
WT. AFTER WASHING (DRY)(B)	502.3 gm	WT.(SSD)(B)			
WT. MINUS NO. 200 MATL.(A-B)	2.5	WT.(H_2O)(A-B)			
% MINUS NO. 200 $\left(\frac{A-B}{A} \times 100\right) = \frac{2.5}{504.8} \times 100 = 0.49\%$		% FREE MOIST. $\left(\frac{A-B}{B} \times 100\right)$			

FIGURE E-1

APPENDIX F

AGGREGATE VISUAL IDENTIFICATION TEST

A. SCOPE

This test method prescribes the procedures for determining if the aggregates appear to be from the sources certified by the Producer. This is a visual test generally performed in conjunction with the aggregate gradation tests.

B. GENERAL

The test is performed by comparing an aggregate sample representing the production to a reference sample for likeness in color, particle shape, etc. The reference sample shall be prepared by the Regional Materials Engineer and placed in the testing laboratory at the plant.

The reference sample shall be prepared by washing aggregate known to be from the certified source. The fine aggregate shall be dried; the coarse aggregate may be kept either dry or wet depending upon the preference of the Materials Engineer. The reference sample shall be identified by source name and number, test number, aggregate size, date prepared and name of person who prepared the sample.

C. SAMPLE

Coarse Aggregate

The aggregates retained on each sieve in the gradation test described in Appendix B, Coarse Aggregate Gradation Test shall be the samples used in this test.

Fine Aggregates

The aggregates retained in the Nos. 8, 16, 30 and 50 sieves in the gradation test described in Appendix D, Fine Aggregate Gradation Test shall be the samples used in this test.

D. EQUIPMENT

The following equipment is required for the coarse aggregate visual identification test:

1. Pans or trays
2. Oven or hot plate
3. Stirring spoon

E. TEST PROCEDURE

1. Wash the aggregates retained on each sieve and place the thoroughly washed aggregate in individual trays.
2. Dry the samples. Do not heat the aggregate excessively because the heat may cause the particles to change color.

   NOTE: If the reference samples for coarse aggregate are kept wet, the samples shall be compared wet.

3. Place the trays containing the test samples adjacent to corresponding samples of the reference material.
4. Compare each size visually for likeness in color, particle shape, etc.

F. REPORT

The production sample shall be compared to the reference sample and the comparison shall be reported on Form BR 317, Aggregate Tests - Portland Cement Concrete Plant. Any differences shall be noted.

G. ACTION

If the Plant Inspector detects a difference in the color or particle shape, which indicates a change in the aggregates, he shall contact the Regional Materials Engineer.

BR 317 (8/74)

NEW YORK STATE DEPARTMENT OF TRANSPORTATION
MATERIALS BUREAU

AGGREGATE TESTS
PORTLAND CEMENT CONCRETE PLANT

PLANT: ABC Concrete Co.	LOCATION: Albany N.Y.		REGION: 1
DATE: 6-2-75	TIME OF SAMPLE: 10:45 A.M.	CONCRETE CLASS: A	TEST: ☒ routine ☐ retest
INSPECTOR: Joe Bushey		CONTRACTS SERVED: FAC 74-8 FISH 74-3	

CHECK TEST(S) REPORTED ON THIS FORM	FINE AGGREGATE	COARSE AGGREGATE
	☒ gradation ☒ minus No. 200 ☒ fineness modulus ☐ moisture ☒ visual ident.	☐ gradation ☐ visual ident. ☐ cleanness ☐ moisture
CHECK SAMPLE LOCATION	FINE AGGREGATE	COARSE AGGREGATE
	☐ belt ☐ barge ☒ stockpile ☐ other ☐ bin	☐ belt ☐ barge ☐ stockpile ☐ other ☐ bin

FINE AGGREGATE TESTS

GRADATION					FINENESS MODULUS		VISUAL IDENTIFICATION
SIEVE	WT.	% RETAINED	% PASSING	SPEC. LIMITS	SIEVE	100-%PASS	Compares favorably to certified aggregate reference sample? ☒ YES ☐ NO
3/8"	0.0	0.0	100	100			
4	40.9	8.1	91.9	90-100	4	8.1	
8	62.1	12.3	79.6	75-100	8	20.4	If "No", explain
16	93.9	18.6	61.0	50-85	16	39.0	
30	115.0	22.8	38.2	25-60	30	61.8	
50	85.5	17.0	21.2	10-30	50	78.8	
100	81.3	16.1	5.1	1-10	100	94.9	
200	23.3	4.6	0.5	0-3			
PAN	2.5	0.5					
TOTAL	504.8	100.0			TOTAL	303.0	

$FM = \left(\frac{\text{total}}{100}\right) = \frac{303.0}{100} = 3.030$

FM (MIX DESIGN): 2.96

FINE AND COARSE AGGREGATE TESTS

MINUS NO. 200 MATERIAL		FREE MOISTURE CONTENT			
AGGREGATE SIZE DESIGNATION	SAND	AGG. SIZE	FINE	NO. 1	NO. 2
WT. ORIGINAL SAMPLE (DRY) (A)	504.8 gm	WT.(WET)(A)			
WT. AFTER WASHING (DRY)(B)	502.3 gm	WT.(SSD)(B)			
WT. MINUS NO. 200 MATL.(A-B)	2.5	WT.(H_2O)(A-B)			
% MINUS NO. 200 $\left(\frac{A-B}{A} \times 100\right) = \frac{2.5}{504.8} \times 100 = 0.49\%$		% FREE MOIST. $\left(\frac{A-B}{B} \times 100\right)$			

FIGURE F-1

APPENDIX G

AGGREGATE FREE MOISTURE CONTENT TEST

A. SCOPE

This test method prescribes the procedure for determining the free moisture content of coarse and fine aggregates.

B. SAMPLE

The sample shall be obtained and reduced to testing size in accordance with Appendix A, Sampling of Aggregates. The amount of aggregate required for a representative sample and the size of sample for testing are as follows:

Size	Original Sample Minimum	Test Sample Minimum
Coarse Aggregate	12 lbs.	3 lbs.
Fine Aggregate	5 lbs.	500 grams

C. EQUIPMENT

The following equipment is required for the aggregate moisture content test:

1. Oven or hot plate
2. Pans
3. Stirring Spoon
4. Brush
5. Small and large capacity scale

D. TEST PROCEDURE

Two test procedures that are equally acceptable are described below. Any other procedure used to determine moisture content shall be approved in writing by the Materials Bureau.

Alternate Test Procedure 1

1. Weigh the aggregate sample.

2. Dry the aggregate to a saturated surface dry condition. (A saturated surface dry condition exists when the visible moisture film has been removed from the aggregate particles. This can be detected by a change in surface color and sheen of the aggregate particles.) Stir the aggregates continuously while drying using extreme care to avoid driving off more than the surface moisture.

3. Cool the sample and weigh.

Alternate Test Procedure 2

1. Weigh the aggregate sample.

2. Dry the sample to a constant weight.

3. Cool the sample and weigh.

4. Add in weight corresponding to the absorption of the particular aggregate to get a saturated surface dry condition. The absorption values may be obtained from the Regional Materials Engineer.

   NOTE: If the aggregate moisture content is less than saturated surface dry, the moisture content will be negative.

E. CALCULATIONS

The free moisture content is computed by using the following formula:

$$Mf = \frac{Wwet - Wssd}{Wssd} \times 100$$

Where:

Mf = Free Moisture, %

Wwet = Weight of Sample (Stockpile, etc.)

Wssd = Weight of Sample at a saturated surface dry condition

F. REPORT

The aggregate moisture content shall be determined and reported on Form BR 317, Aggregate Tests - Portland Cement Concrete Plant. Round off the moisture content to the nearest 0.1 percent.

G. ACTION

The Plant Inspector shall take the appropriate action described in Section 2-2.014 (f), Aggregate Free Moisture Content.

BR 317 (8/74) NEW YORK STATE DEPARTMENT OF TRANSPORTATION
MATERIALS BUREAU

AGGREGATE TESTS
PORTLAND CEMENT CONCRETE PLANT

PLANT: ABC Concrete Co.	LOCATION: Albany N.Y.		REGION: 1
DATE: 6-2-75	TIME OF SAMPLE: 10:50 A.M.	CONCRETE CLASS: A	TEST: ☒ routine ☐ retest
INSPECTOR: Joe Bushey		CONTRACTS SERVED: FAC 74-8 FISH 74-3	

CHECK TEST(S) REPORTED ON THIS FORM	FINE AGGREGATE	COARSE AGGREGATE
	☒ gradation ☒ minus No. 200 ☒ fineness modulus ☒ moisture ☒ visual ident.	☐ gradation ☐ visual ident. ☐ cleanness ☐ moisture
CHECK SAMPLE LOCATION	FINE AGGREGATE	COARSE AGGREGATE
	☐ belt ☐ barge ☒ stockpile ☐ other ☐ bin	☐ belt ☐ barge ☐ stockpile ☐ other ☐ bin

FINE AGGREGATE TESTS

GRADATION					FINENESS MODULUS		VISUAL IDENTIFICATION
SIEVE	WT.	% RETAINED	% PASSING	SPEC. LIMITS	SIEVE	100-%PASS	Compares favorably to certified aggregate reference sample? ☒ YES ☐ NO
3/8"	0.0	0.0	100	100			
4	40.9	8.1	91.9	90-100	4	8.1	
8	62.1	12.3	79.6	75-100	8	20.4	If "No", explain
16	93.9	18.6	61.0	50-85	16	39.0	
30	115.0	22.8	38.2	25-60	30	61.8	
50	85.5	17.0	21.2	10-30	50	78.8	
100	81.3	16.1	5.1	1-10	100	94.9	
200	23.3	4.6	0.5	0-3			
PAN	2.5	0.5					
TOTAL	504.8	100.0			TOTAL	303.0	

$FM = \left(\frac{\text{total}}{100}\right) = \frac{303}{100} = 3.03$

FM (MIX DESIGN): 2.96

FINE AND COARSE AGGREGATE TESTS

MINUS NO. 200 MATERIAL		FREE MOISTURE CONTENT			
AGGREGATE SIZE DESIGNATION	SAND	AGG. SIZE	FINE	NO. 1	NO. 2
WT. ORIGINAL SAMPLE (DRY) (A)	504.8 gm	WT.(WET)(A)	510.0 gm		
WT. AFTER WASHING (DRY)(B)	502.3 gm	WT.(SSD)(B)	498.2 gm		
WT. MINUS NO. 200 MATL.(A-B)	2.5	WT.(H_2O)(A-B)	11.8		
% MINUS NO. 200 $\left(\frac{A-B}{A} \times 100\right) = \frac{2.5}{504.8} \times 100 = 0.49\%$		% FREE MOIST. $\left(\frac{A-B}{B} \times 100\right)$	$\frac{11.8}{498.2} \times 100 = 2.37\%$		

FIGURE G-1

APPENDIX H

SCALE ACCURACY CHECK

A. SCOPE

This method prescribes the procedure for checking the accuracy of the aggregate, cement and water scales.

B. GENERAL

The scales shall be tested by the build-up incremental loading method using ten standard fifty pound weights supplied by the Producer. The loading increment shall not exceed five (5) percent of the dial face capacity. In most cases, the aggregate scales will be tested in 500 pound increments due to the limited number of available testing weights.

When plants are equipped with dual range scales, each scale range shall be tested throughout its working range. Also repeating scales or digital readout devices shall be tested at the same time.

Before the scale accuracy check is performed, the Inspector should inspect the condition of the weighing system. Some of the components that should be checked are as follows:

1. Proper seating of knife edges
2. Cleanliness of levers, knife edges and bearings
3. Binding of scale system
4. Tightness of sliding weights on scale levers
5. Sensitivity of scale - the dial indicator should stand at zero with no load and swing freely when the tare beam lever or draft rod is moved.
6. Cleanliness of glass on dial face

C. TEST PROCEDURE

The scale accuracy shall be checked using the procedures described by the following example and shown in Figure H-1. The steps are in sequence.

Example

Check the accuracy of an aggregate scale having a dial face capacity (working range) of 20,000 pounds.

1. Determine the allowable scale tolerance

   20,000 x 0.001 = ± 20 lbs.

2. Determine the largest allowable loading increment

   20,000 x 0.05 = 1,000 lbs.

3. Record the zero dial reading in column #1 of the Form BR 191, Concrete Plant Scale Check. If it is necessary to place a cradle, platform or weight tree on the weigh hopper on which to suspend or place weights, tare the scale to zero or record the cradle weight and treat this reading as the zero.

4. Place the weights on the suspension system. In this example, loading increments of 500 lbs. are used.

5. In Column #2 record the sum of Column #1 plus the added weights.

6. In Column #3 record the actual dial reading.

7. Subtract the figure in Column #2 from that in Column #3 and enter the result in Column #4. Be careful with the algebraic sign of this result as it will induce a large mistake into your scale check if it is incorrect.

8. Remove the weights and draw material until you reach the last weight in Column #3. This weight should be as close as possible to the last Column #3 weight. Record the actual scale reading in Column #1. Replace the weights on the scale system and repeat steps 5, 6 and 7.

9. The accumulated scale error (Column #5) is determined by algebraically adding the scale errors in Column #4. If the accumulated scale error in Column #5 exceeds the allowable scale tolerance at any point, the batching system does not meet the specification requirements.

10. This procedure is continued throughout the working range of the batching system and does not necessarily have to be the full capacity of the scale.

11. If there are repeating dials in the system, they must be within one graduation of the primary dial heads throughout the working range of the batching system. Note the reading of the repeating dials at the same time as the primary dials and enter that reading in Column #6. Subtract the figure in Column #6 from the figure in Column #3 and enter the result in the appropriate section of Column #7.

NOTE: It should be noted that if adjustments are made to scales at any time during test procedure, it is necessary to start test procedure over from the beginning.

D. REPORT

The results shall be reported on Form BR 191, Concrete Plant Scale Check.

E. ACTION

The Plant Inspector shall take the appropriate action described in Section 2-3.01, Weighing Units and Measuring Devices.

BR 191a (8/74) NEW YORK STATE DEPARTMENT OF TRANSPORTATION
MATERIALS BUREAU

CONCRETE PLANT SCALE SCHECK

REGION	PLANT & LOCATION	DATE
1	ABC Concrete Co. Albany N.Y.	2-4-15

SCALE

MAKE	MODEL
Howe-Richardson	XL-400

TYPE	CAPACITY	GRADUATION
☒ AGGREGATE ☐ CEMENT ☐ WATER	20,000 pounds	20 pounds

ALLOWABLE TOLERANCE	MAXIMUM LOADING INCREMENTS	CK.
20000 x 0.001 = 20 lbs	20000 x 0.05 = 1000	SI

LOAD TEST

COL. 1 DIAL READING MATERIAL ONLY	COL. 2 DIAL READING MATERIAL & ADDED WTS.	COL. 3 ACTUAL DIAL READING (PRIMARY)	COL. 4 (COL. 3-2) HIGH +	COL. 4 (COL. 3-2) LOW -	COL. 5 SCALE ERROR	COL. 6 REPEATING DIAL READING	COL. 7 REPEATING DIAL ERROR (COL. 6-3) HIGH +	COL. 7 REPEATING DIAL ERROR (COL. 6-3) LOW -
0	500	500	-	-	-	490		10
510	1010	1000		10	-10	1000	-	-
1020	1520	1510		10	-20	1510	-	-
1500	2000	2000	-	-	-20	2010	10	
2010	2510	2520	10		-10	2520	-	-
2550	3050	3050	-	-	-10	3060	10	
3000	3500	3490		10	-	3490	-	-
3530	4030	4030	-	-	-	4020		10
4020	4520	4510		10	-10	4510	-	-
4510	5010	5010	-	-	-10	5000		10

(Continue the test until the known load reaches the full working range of the scale.)

FIGURE H-1

APPENDIX I

METER ACCURACY CHECK

A. SCOPE

This test method prescribes the procedure for checking the accuracy of the water meter. Also the admixture metering device shall be checked in the same manner except that a calibrated flask shall be used to determine the quantity of admixture dispensed.

B. GENERAL

Water is either metered into a holding tank that discharges into a mixer or it is metered directly to a mixer. Water can usually be sampled by attaching a hose to an outlet in the bottom of the holding tank or by diverting the water at some intermediate point between meter and mixer. Obtaining samples of water for meter checking purposes is not always easy and may require some ingenuity and imagination on the Inspector's part.

In order to check a meter, it is necessary to have one or two 55 gallon drums or other suitable containers. If a portable scale of adequate capacity is not available to weigh the water, it will be necessary to have containers available of known volume. A small container of known volume can be used to calibrate a larger container such as a 55 gallon drum.

The meter accuracy requirement is the same as the delivery tolerance given in Section 501 of the General Specifications.

C. TEST PROCEDURE

1. Utilizing a portable platform scale of suitable capacity or the cement scale (if graduations are smaller than allowable meter tolerances) with a suitable loading apparatus, obtain weight of the empty container(s). If a scale is not available, use a container of known volume or calibrate a drum with a smaller container of known volume.

2. Index a quantity of water into the metering system or draw the water manually. Discharge the water into the sample container(s) and observe the meter reading.

3. Obtain the weight of the filled container(s) and determine the weight of the water sample. 1 gallon = 8.34 lbs. If calibrated container of known volume is used, observe amount of water metered into container.

D. REPORT

The results shall be recorded in the Inspector's daily diary.

E. ACTION

The Plant Inspector shall take the appropriate action described in Section 2-3.01, Weighing Units and Measuring Devices.

APPENDIX J

BD 180 (6-74)

STATE OF NEW YORK — DEPARTMENT OF TRANSPORTATION

ANNUAL INSPECTION RECORD

PORTLAND CEMENT CONCRETE BATCH PLANT

YEAR 1975

PLANT CODE: 7 0 0 1

REGION: 1	PLANT NAME: ABC Concrete Co.	LOCATION: Albany	
MAILING ADDRESS: Box 35 Albany N.Y.			PLANT PHONE NO: 456-9951
OFFICIAL BIDDING NAME: ABC Concrete Co.		PHYSICAL BIDDING ADDRESS: East Lake Dr. Albany N.Y.	
PLANT TYPE: ☒ DRY BATCH ☐ CENTRAL MIX ☒ PERMANENT ☐ PORTABLE		MAKE: Erie-Strayer	MODEL NO: L32YX
APPROVAL DATES: AUTOMATION 2/4/75 ADMIXTURE SYSTEM 2/4/75		LAST CHG. DATE: NEW	LOCATION

INSPECTED BY: Joe Bushey

TITLE: P.E.T. DATE: 6/4/75

REGIONAL RECOMMENDATION FOR APPROVAL

REGIONAL DIRECTOR	DATE

APPROVAL LIMITATIONS

DEPUTY CHIEF ENGINEER

TECHNICAL SERVICES SUBDIVISION	DATE

FIGURE J-1

BR 180 2b (4/74)

USUAL AGGREGATE SOURCES

COARSE: [X] CRUSHED STONE [ ] CRUSHED GRAVEL [ ] CRUSHED SLAG
SOURCES: XYZ Sand & Gravel - Latham, N.Y.

FINE: [X] NATURAL SAND [ ] MANUFACTURED SAND
SOURCES: XYZ Sand & Gravel - Latham, N.Y.

AGGREGATE DELIVERY: [X] TRUCK [ ] BARGE [ ] RAIL [ ]

AGGREGATE STOCKPILES: [X] LARGE STOCKPILES AT PLANT [ ] SMALL STOCKPILES AT PLANT [ ] BARGE AT PLANT
[ ] NO STOCKPILES, CONTINUOUS DELIVERY [ ] _____
SEPARATED ADEQUATELY [X] YES [ ] NO

CEMENT

STORAGE CAPACITY (BBLS): 1600
NO. of SILOS: 2
NORMAL SUPPLIERS: Universal Atlas - Hudson, N.Y.
RECEIVED BY: [X] TRUCK [ ] BARGE [ ] RAIL
SEAL CONTROL ADEQUATE [X] YES [ ] NO

AGGREGATE

[X] BLENDED AT SOURCE [ ] AT PLANT BY BELT [ ] OTHER (Describe) _____

SAMPLING POINT: [X] STOCKPILES [ ] BELTS [ ] BARGE [ ] BIN [ ] WEIGH HOPPER
[ ] BUILT IN SAMPLING DEVICE [ ] OTHER (Describe) _____

WATER

SOURCE: City Water
MOISTURE METER INSTALLED [X] YES [ ] NO

ADMIXTURE

STORAGE: [X] BULK SYSTEM [ ] DRUMS [ ] OTHER _____ NO. DISPENSERS: 2
EQUIPMENT: [X] VISUAL TUBE [ ] TIMER CONTROL [X] METER CONTROL
[ ] PROBE CONTROL INTERLOCKED WITH AUTOMATION [X] YES [ ] NO

USUAL AEA USED: Airalon
USUAL WATER REDUCER USED: None
USUAL RETARDER USED: Daratard
OTHER ADMIXTURE USED: None

BATCHING SCALES AND/OR METERS

ITEM	TYPE: Dial	TYPE: Beam	TYPE: Digital	SLAVE SCALE: Yes	SLAVE SCALE: No	MAKE	CAPACITY (LB)	MIN GRAD (LB)
AGGREGATE SCALE	X				X	Detecto	40,000	40
AGGREGATE SCALE								
AGGREGATE SCALE								
CEMENT SCALE	X				X	Detecto	8,000	8
CEMENT SCALE								
WATER	Scale	Meter X				CAPACITY (GAL) 999	MIN GRAD (GAL) 1	

SCALE CHECKING FACILITIES: [X] PLATFORMS [ ] HOOKS
[ ] CHAINS/CABLES [ ] OTHER (Describe) _____
NO. 50 LB WT AVAILABLE: 12
SCALE TECHNICIAN HIRED OR CONTRACTED [X] YES [ ] NO
DATE OF LAST SCALE CHECK: 6/4/75

BR 180 3b (4/74)

BATCHING/ RECORDING EQUIPMENT

CONTROL TYPE: [X] AUTOMATIC [ ] MANUAL

DOES MANUAL CONTROL PLANT HAVE CEMENT INTERLOCK? [ ] YES [ ] NO

MAKE: AUTOMATION SYSTEM: Erie-Strayer

RECORDER: NCR [ ] TAPE [X] TICKET

FORMULA SELECTION: [X] CARDS [X] PRESETS [ ] OTHER

ARE SCALES, LEVERS, AND RECORDERS SHROUDED AS REQUIRED? [X] YES [ ] NO

MINIMUM BATCH WEIGHTS	AGGREGATE (LB)	CEMENT (LB)
	4,000	160

LIMITATIONS OR RESTRICTIONS:

Presets are not approved for state work

PLANT FEATURES (DRY BATCH)

LAYOUT: [X] END STOP [ ] TWO STOP

NO. AGGREGATE BINS	NO. AGGREGATE BATCHERS
6	1
NO. CEMENT BINS	**NO. CEMENT BATCHERS**
2	1

PROVISIONS FOR WINTER CONCRETE:

Aggregates heated by steam; water heated by boiler

CENTRAL MIX PLANT DETAILS

MIXER CONDITION: [ ] Satisfactory [ ] Unsatisfactory

TYPE: [ ] TILTING [ ] VERTICAL SHAFT [ ] OTHER

MAKE:

RATED CAPACITY (CY):

MIXING TIME: [ ] 90 SEC [ ] 75 SEC [ ] 60 SEC

DATE OF REDUCED MIX TIME APPROVAL:

CHARGING SEQUENCE (DESCRIBE):

TIME/DATE PRINTING ON DELIVERY TICKETS

[X] PRINTED BY TICKET TYPE RECORDER

[ ] PRINTED ON TAPE BY TAPE TYPE RECORDER: TAPE SENT W/DELIVERY TICKET

[ ] PRINTED BY TIME CLOCK DEVICE

[ ] NOT USED, TICKET REQUIREMENTS WAIVED (ON SITE PROJECT PLANTS SUPPLYING PAVEMENT CONCRETE ONLY)

[ ] OTHER (DESCRIBE):

DELIVERY UNIT TYPES

[ ] TRUCK MIXERS [X] OPEN HAUL UNITS

[X] TRUCKS APPROVED FOR TRANSIT MIXING

[ ] OTHER (DESCRIBE):

BR 180 4b (4/74)

INSPECTION FACILITIES

LOCATION AND DESCRIPTION

Shed 50' from plant with heat, lights, and phone

ROOM DIMENSION: 12 x 40

INSPECTOR'S EXCLUSIVE USE: ☒ YES ☐ NO (EXPLAIN)

DOES INSPECTION FACILITY MEET THE REQUIREMENTS OF SECTION 601.3.02F ☒ YES ☐ NO

IF NO, EXPLAIN.

CONDITION ☒ SATISFACTORY ☐ UNSATISFACTORY (EXPLAIN)

CAN FACILITY BE IMPROVED FOR BETTER OPERATIONS? ☒ NO ☐ YES (EXPLAIN)

PHONE NO.: 456-9951

IF NO TELEPHONE, DESCRIBE ALTERNATE MEANS OF COMMUNICATIONS UNDER REMARKS

SAFETY

AREAS NEEDING IMPROVEMENT FOR SAFER INSPECTION DUTIES

REMARKS

01482
LRI